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## Presentation: Assessing the Natural Rate of Unemployment

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## Presentation: Assessing the Natural Rate of Unemployment

### Keywords

unemployment rate, worker reallocation rate, NAIRU, QWI

### Comments

Presentation given by Director John M. Abowd at the Federal Reserve Bank of Boston's [57th Annual Economics Conference](#)

# Assessing the Natural Rate of Unemployment

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Cornell University

Federal Reserve Bank of Boston  
Fulfilling the Full Employment Mandate  
April 12-13, 2013

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- No confidential data were used to prepare this paper
- The opinions expressed in this presentation are those of the authors and not the National Science Foundation nor the Census Bureau

# Outline

- Motivation
- Local labor markets and the Quarterly Workforce Indicators
- Data sources and definitions
- Estimation of national time series
- Results
- Conclusions

# Motivation

- In a fully integrated economy like the U.S. there is only one “Natural Rate of Unemployment”
- It is the national rate that is the focus of monetary and fiscal policy
- Local labor markets influence the national natural rate but do not have their own “natural rates”

# From National to Local

- Statistical analysis of the local labor markets in the U.S. often begins with the local area unemployment statistics (LAUS) from the BLS
- These data are designed to measure local deviations from the national data
- Their contribution to the national trend + cycle estimate is nil by construction

# From “Local” to “National”

- Statistical analysis of “local” labor markets in the euro zone begins with member country national data
- Euro-zone-wide analyses aggregate these “local” labor markets to a euro-wide market
- The single “Natural Rate of Unemployment” for this “national” market is extracted from unemployment data aggregated to the euro zone
- There is no independent estimate of euro-zone-wide unemployment



# In This Paper

- We try to have it both ways
- National unemployment statistics and their controlled local components from the BLS
- Local labor market statistics from the Census Bureau independently aggregated to the national level
- Is the trend + cycle component comparable?
- If so, the natural rate of unemployment extracted from such series will also be comparable
- And, yes, that's what we find

# Worker and Job Flow Background

- Gross job flows:
  - Dunne, Roberts and Samuelson (1989)
  - Davis and Haltiwanger (1990, 1992)
  - Davis, Haltiwanger and Schuh (1996)
  - BLS Business Employment Dynamics (Spletzer et al. 2004)
- Gross worker flows:
  - Abowd and Zellner (1985)
  - Poterba and Summers (1986)
  - Anderson and Meyer (1994)
  - BLS Job Openings and Labor Turnover Survey (Boon et al. 2008)
- Integrated flows (Worker, Job, Excess/Churning)
  - Abowd, Corbel and Kramarz (1999)
  - Burgess, Lane and Stevens (2000, 2001)
  - BLS JOLTS + BED (Davis, Faberman and Haltiwanger 2006; Boon et al. 2008; Davis, Faberman, Haltiwanger, and Rucker 2010)

# Quarterly Workforce Indicators

- Local labor market data
- Prepared by the Census Bureau (LEHD Program)
- Based on integrated UI wage records, QCEW establishment data, demographic data (censuses, surveys and administrative), business data (censuses, surveys and administrative)

# Basic QWI Definitions

$B_{agkst}$   $\equiv$  beginning-of-quarter employment

$E_{agkst}$   $\equiv$  end-of-quarter employment

$F_{agkst}$   $\equiv$  full-quarter employment

$M_{agkst}$   $\equiv$  raw count of jobs in quarter

- These job estimates are available in the QWI for age groups, gender, race, ethnicity, education, firm size, firm age, NAICS sector, subsector, industry group, county, CBSA, state, and ownership; quarterly from 1990:1 to 2012:2

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# Longitudinal Employer-Household Dynamics

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## Applications

- OnTheMap
- OnTheMap for Emergency Management
- LED Extraction Tool
- QWI Online
- Industry Focus

## Useful Links

- Center for Economic Studies
- QWI
- Cornell VirtualRDC
- LED Workshop
- CED HotReport

## Contact Information

Email us:  
[CES.Local.Employment.Dynamics@census.gov](mailto:CES.Local.Employment.Dynamics@census.gov)

### Get the LED Out!

The new LED Extraction Tool allows streamlined access to the entire set of raw Quarterly Workforce Indicators (QWI) data through an intuitive query-building interface.

[Learn more](#) (76 KB)

[Start the LED Extraction Tool](#)

### LED Extraction Tool (Beta)

1. Area of Interest | 2. Firm Characteristics | 3. Worker Characteristics | 4. Indicators | 5. Quarters | 6. Summary and Export

States

Search:

Alabama

Counties: 67, Metro/Metropolitan Areas: 26, Workforce Investment Areas: 10

Geography Types

States

Counties

Metro/Metropolitan Areas

Workforce Investment Areas

Areas

Search:

Check All | Check None | Invert Selection

☒ 01001 Autauga, AL

☐ 01003 Baldwin, AL

☐ 01005 Barbour, AL

☐ 01007 Bibb, AL

☐ 01009 Blount, AL

☐ 01011 Bullock, AL

☐ 01013 Butler, AL

☐ 01015 Calhoun, AL

☐ 01017 Chambers, AL

☐ 01019 Cherokee, AL

☐ 01021 Chilton, AL

☐ 01023 Choctaw, AL

☐ 01025 Clarke, AL

Note: A state-level summary will be included in the results for all sub-state geography types.

Continue with Selected Areas

## What's New?

- 04/10/13: [Registration is now open for the 2013 Local Employment Dynamics \(LED\) Partnership Workshop](#)



## VRDC Data @ Cornell

### QWI Public Use files

These are public-use data files as published by the U.S. Census Bureau, [LEHD Program](#). These files are provided as a convenience for the community. No support or guarantees are offered, but feedback is appreciated. The most current data can be found below. Other release directories are available for archival purposes, but users should note that the entire (revised) time series is released every quarter (thus constituting a release). Files are organized by state. Some information on the structure is available in the VRDC-provided [QWI cheatsheet](#). Researchers wishing to use the "short" academic names for variables (*a,s,j,c*, etc., as per notation in [Abowd et al. 2009](#)), rather than the "long" names used in the public-use files (CSV headers: *HirA,Sep,FrmJbGn*), can consult or run the following [SAS program](#). For information on formats and compression, see [this page](#).

QWI files on this site up to R2008Q2 use 2005 geography definitions. TIGER 2005 Second Edition was used for some of the geography coding. Note however that public-use QWI are only available to the county level. You can find additional information on these files at the [Census Bureau website TIGER 2005 page](#). The actual geography definition files are no longer available on the Census Bureau website, a local copy has been archived on this site in the [TIGER 2005 SE archive site/](#) directory.

QWI files after R2008Q3 use TIGER 2006 Second Edition. The definition files for TIGER 2006 SE can be found on the [Census Bureau's TIGER 2006SE website](#). An archival version can be found on this site in the [TIGER 2006SE archive site/](#)

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# Accessions and Separations

$A_{agkst} \equiv$  all jobs not present in the previous quarter

$S_{agkst} \equiv$  all jobs not present in the next quarter

$CA_{agkst} \equiv M_{agkst} - S_{agkst} - F_{agkst}$

$CS_{agkst} \equiv M_{agkst} - A_{agkst} - F_{agkst}$

- $A$  is the most inclusive accession measure
- $S$  is the most inclusive separation measure
- $CA$  is accessions still employed at the end of the quarter
- $CS$  is separations of those who were employed at the beginning of the quarter
- Using  $CA$  and  $CS$  eliminates all strictly within quarter worker flows

# Accession and Separation Rates

$$car_{agkst} = \frac{CA_{agkst}}{(B_{agkst} + E_{agkst})/2}$$

$$csr_{agkst} = \frac{CS_{agkst}}{(B_{agkst} + E_{agkst})/2}$$

- These rates are the fundamental worker flows used in this paper



# Job Creation and Destruction Rates

$$jcr_{agkst} = \frac{JC_{agkst}}{(B_{agkst} + E_{agkst})/2}$$

$$jdr_{agkst} = \frac{JD_{agkst}}{(B_{agkst} + E_{agkst})/2}$$

- Job creations ( $JC$ ) and destructions ( $JD$ ) in the QWI are defined in the usual manner at the establishment level
- These are the basic job flow measures used in this paper

# Excess Accession Rate

$$eir_{agkst} = car_{agkst} - jcr_{agkst}$$

- The excess accession rate (also called the excess inflow rate) measures the hiring that occurs in excess of the amount needed to fill newly created jobs

# Statistical Methodology

- Divide the analysis into two periods
  - 1993:1-2001:4 (early period, many states are completely missing, 10 states complete)
  - 1999:1-2010:4 (later period, 40 states are complete)
  - Data from 49 states and DC used overall
- For each sub-period use a multiple imputation model to complete the missing data
- For the overlap period, use a ramped weight to compute the average implicate combining the two periods
- Use the standard multiple imputation formulae to combine implicates

# National Estimates

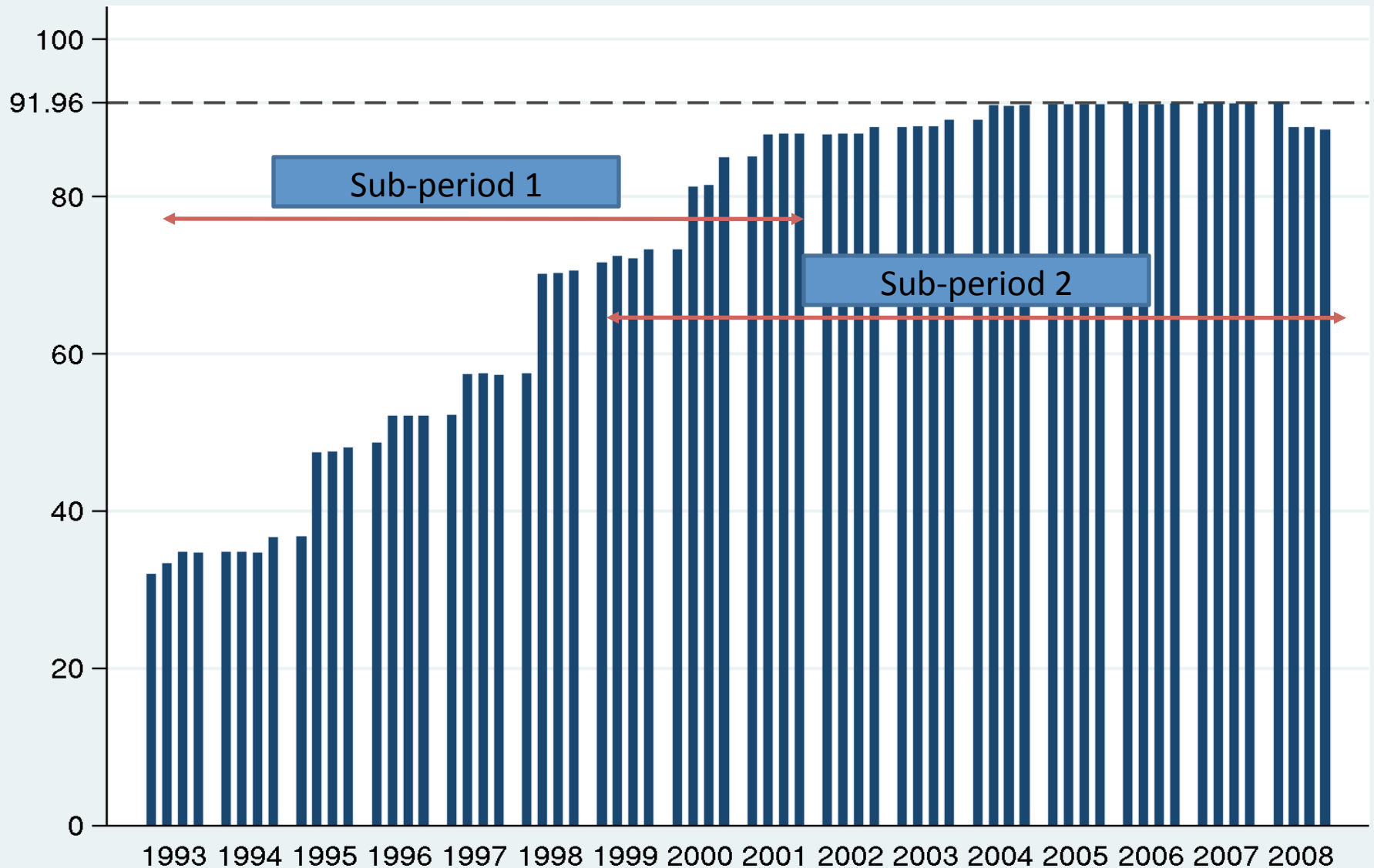
$$\begin{aligned} car_{agt} &= \frac{CA_{agt}}{(B_{agt} + E_{agt})/2} \\ &= \frac{2}{B_{agt} + E_{agt}} \left[ \sum_{k,s} \left( \frac{B_{agkst} + E_{agkst}}{2} \right) car_{agkst} \right] \end{aligned}$$

- The combining formula for producing the national *car* is shown above (similar formulae apply to other rates)

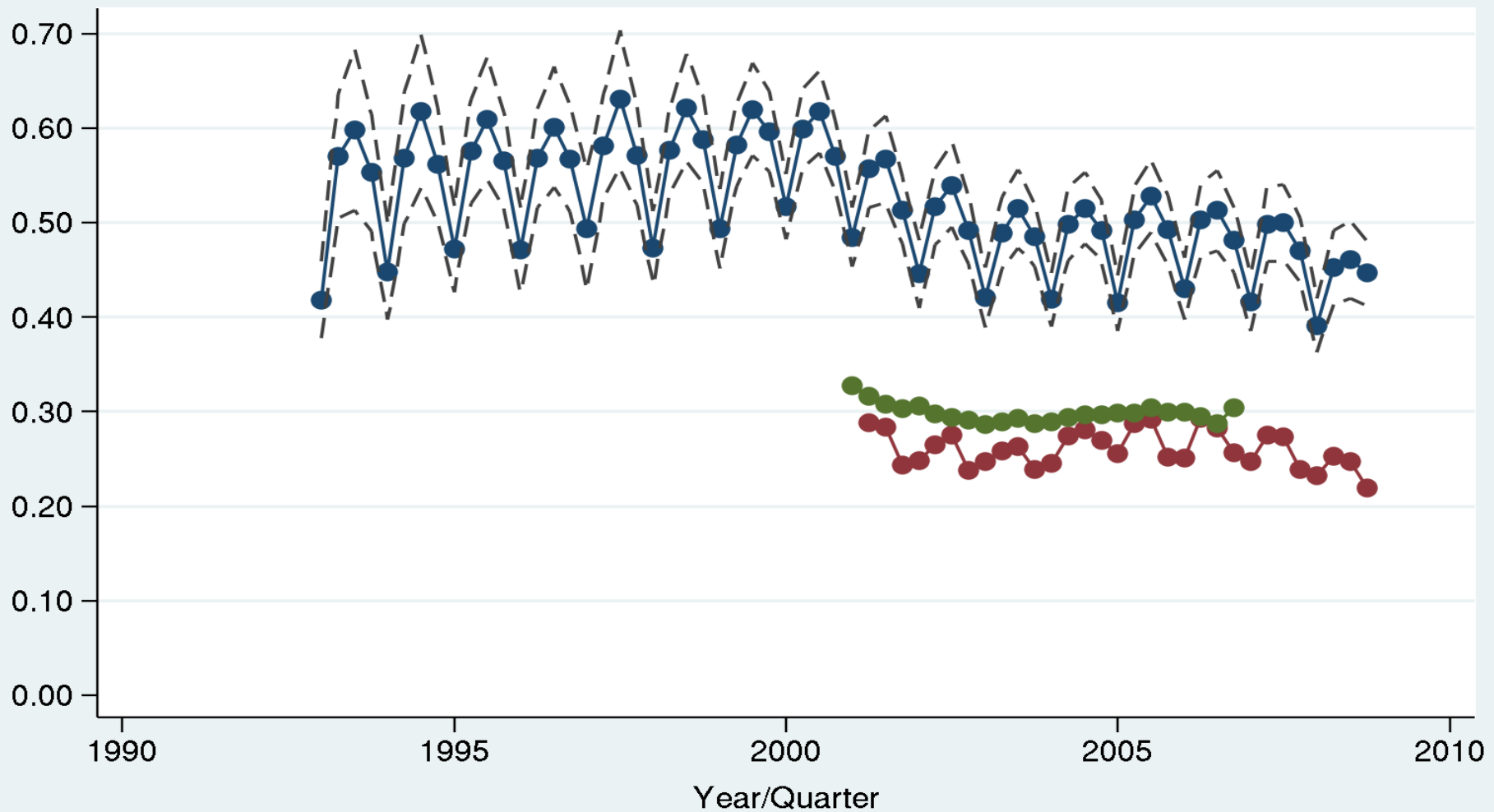
# Implicate Combining Formula

$$\overline{car}_{agkt} = \frac{1}{M} \sum_{\ell=1}^M \left[ \sum_{\forall s} \frac{\left( \frac{B_{agskt}^{(\ell)} + E_{agskt}^{(\ell)}}{2} \right) car_{agskt}^{(\ell)}}{\sum_{\forall v} \frac{B_{agvkt}^{(\ell)} + E_{agvkt}^{(\ell)}}{2}} \right]$$

# QWI Coverage of the Private Workforce

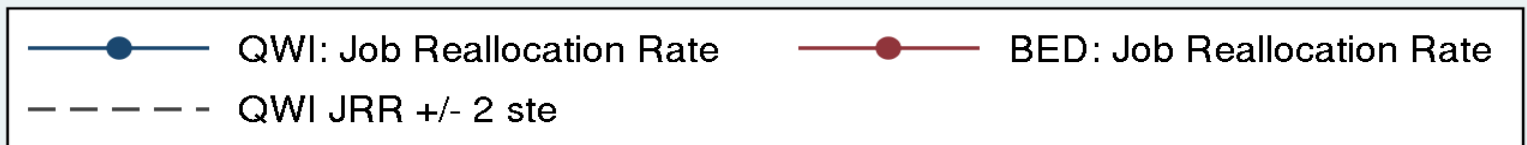
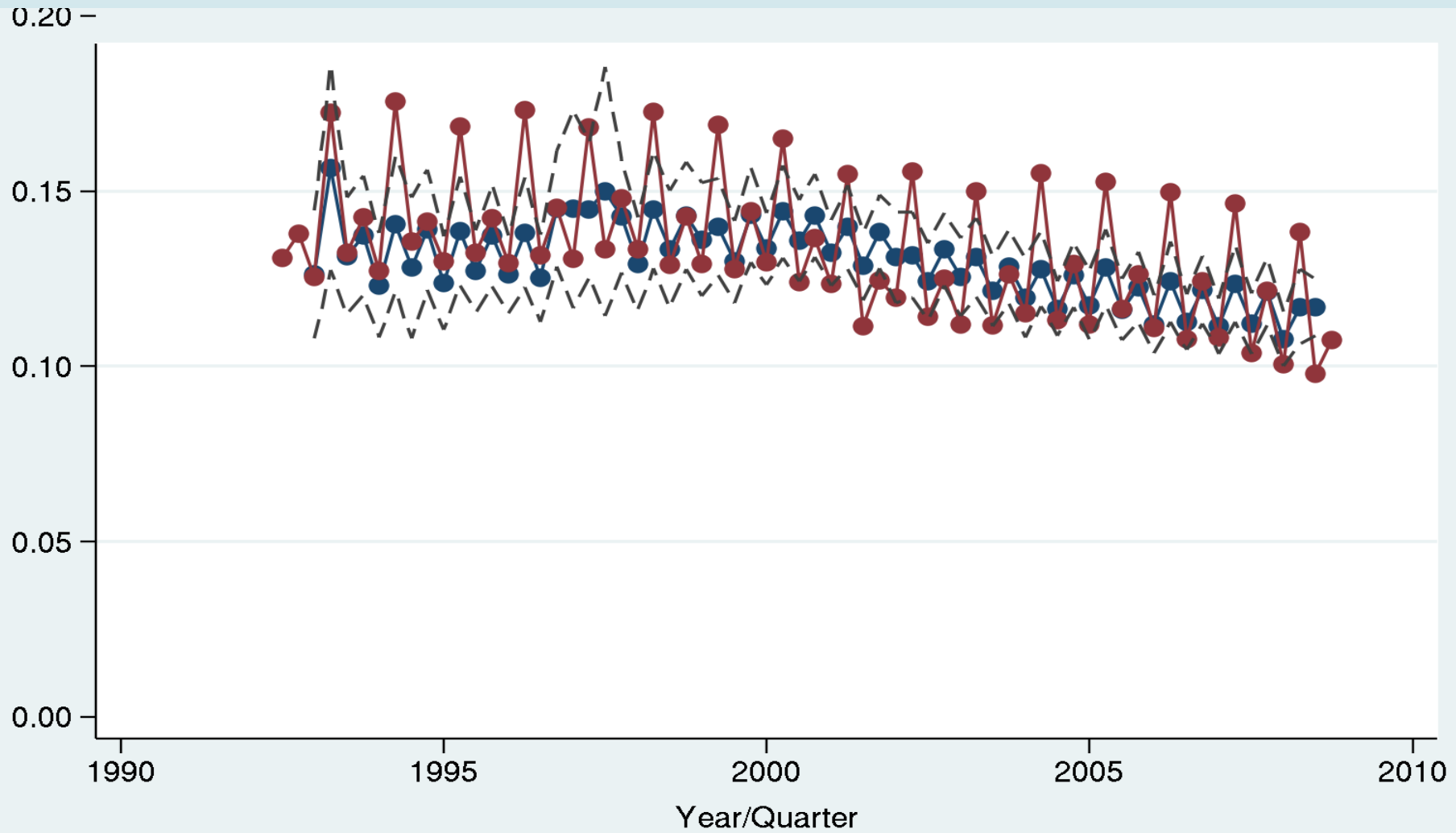


# WRR: QWI v. Adjusted JOLTS



—●— QWI: Worker Reallocation Rate —●— JOLTS: Worker Reallocation Rate  
—●— JOLTS: WRR adjusted

# JRR: QWI v. BED





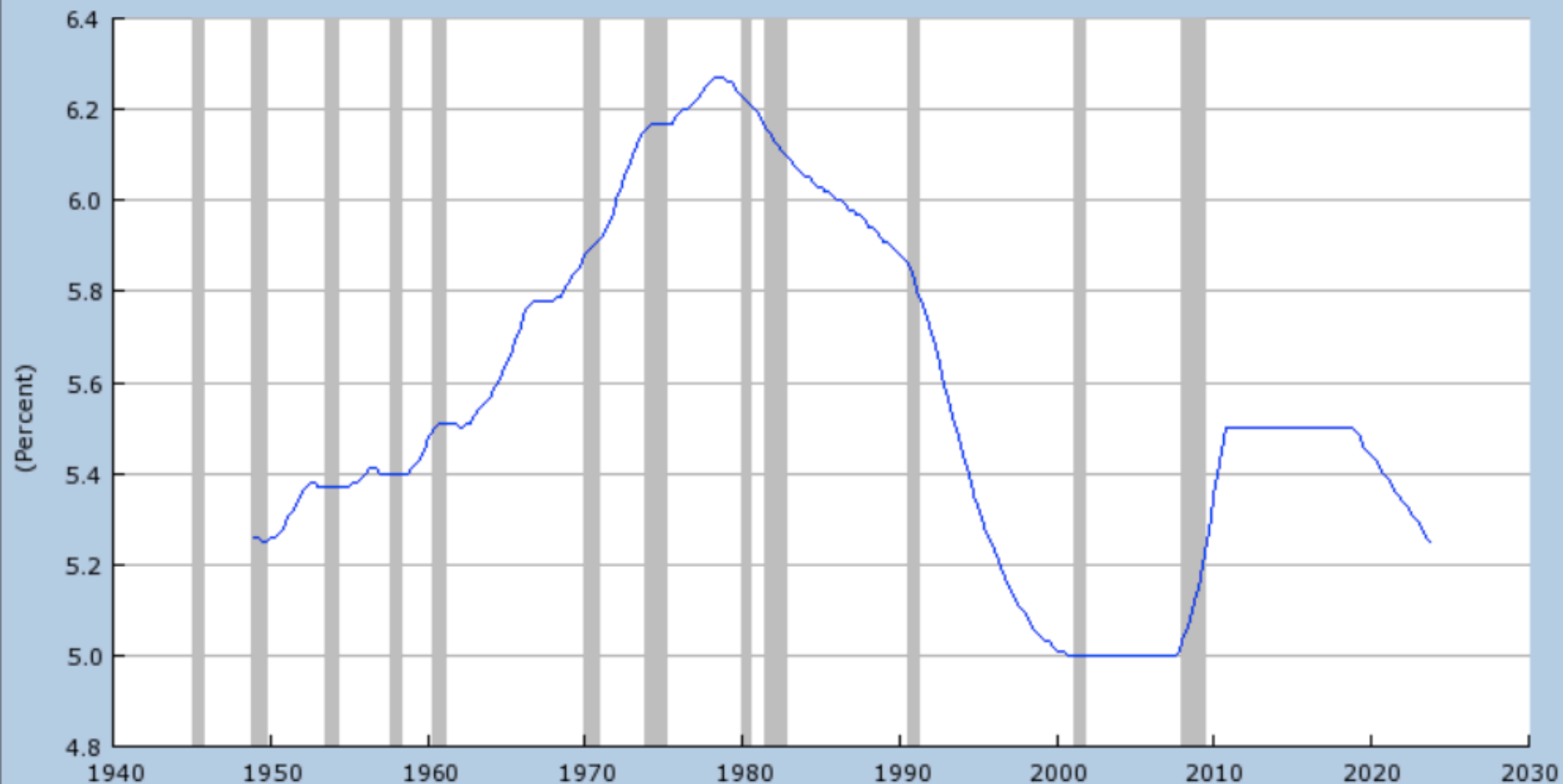
# Unemployment Rates

- The national unemployment used in this paper is the official “headline” rate
- The local unemployment rates are the state-level LAUS rates
- For both measures, the quarterly rate used is the monthly rate from the first month of the next quarter
- This convention makes changes in these rates cover the same three-month period as the QWI rates with an offset of 12 days
- This is the closest match that can be achieved

# Natural Rate of Unemployment

- We do not estimate our own version of the natural rate
- We use the CBO “headline” version (long run)
- Extracted from FRED

Natural Rate of Unemployment (Long-Term) (NROU)  
Source: U.S. Congress: Congressional Budget Office

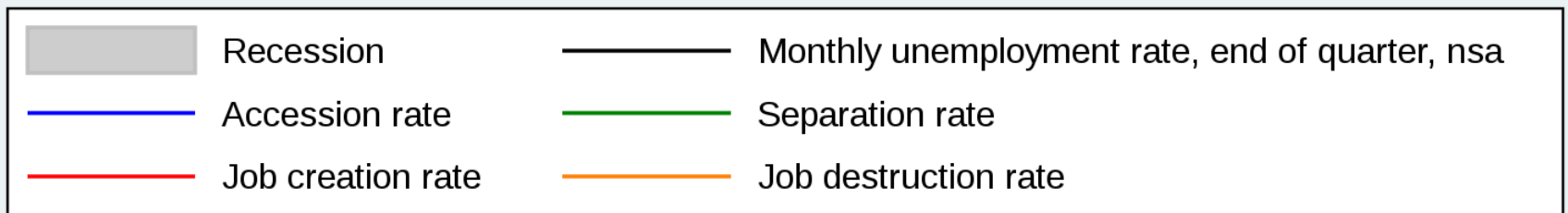
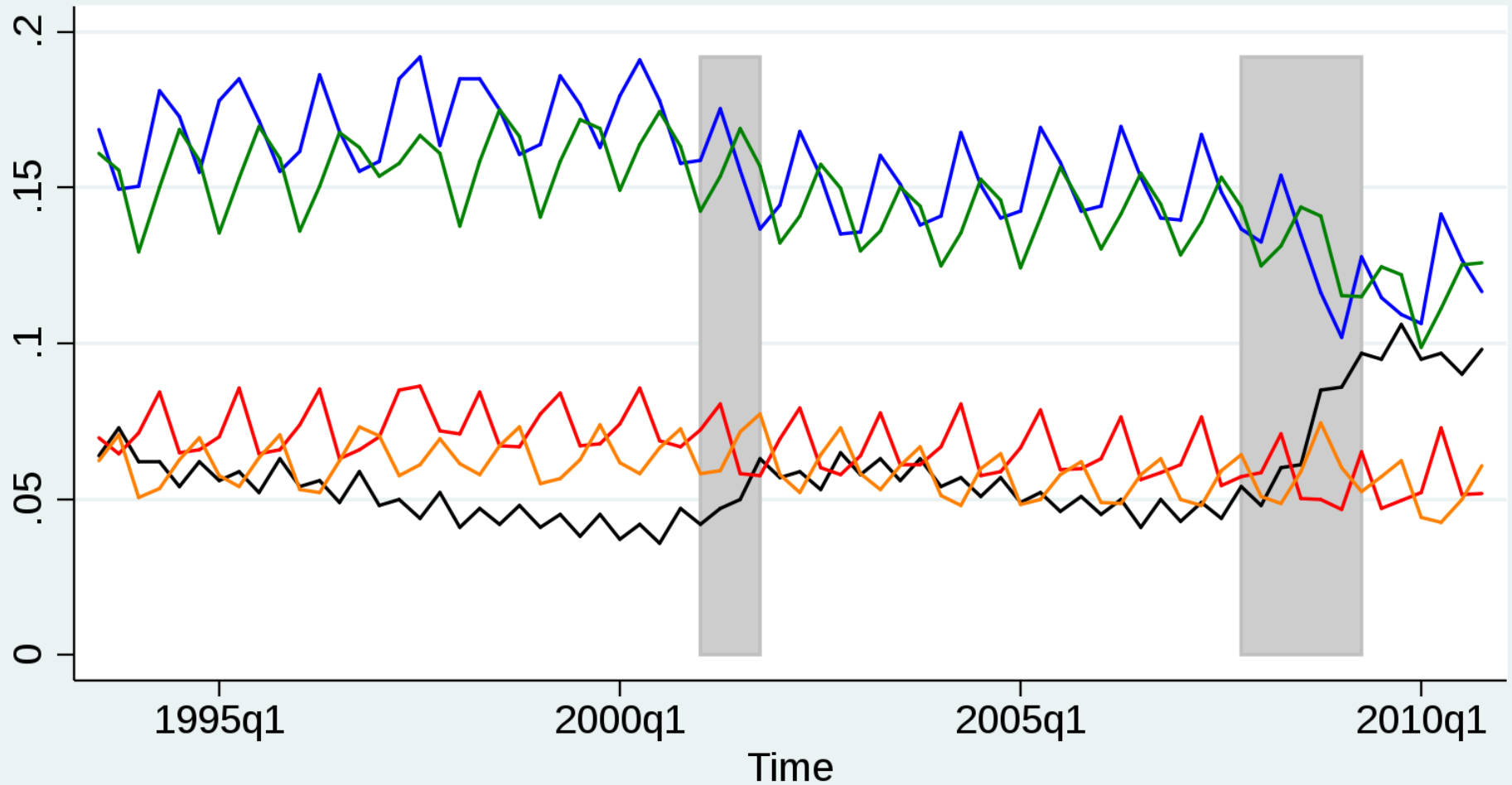


Shaded areas indicate US recessions.  
2013 research.stlouisfed.org

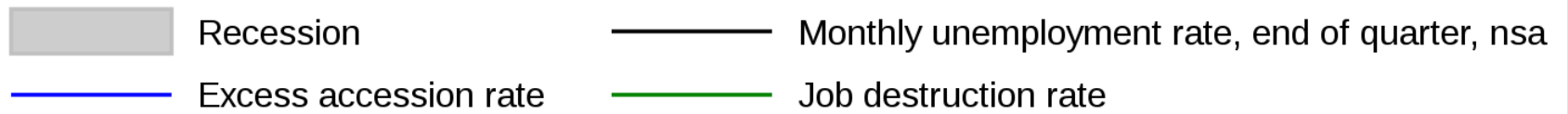
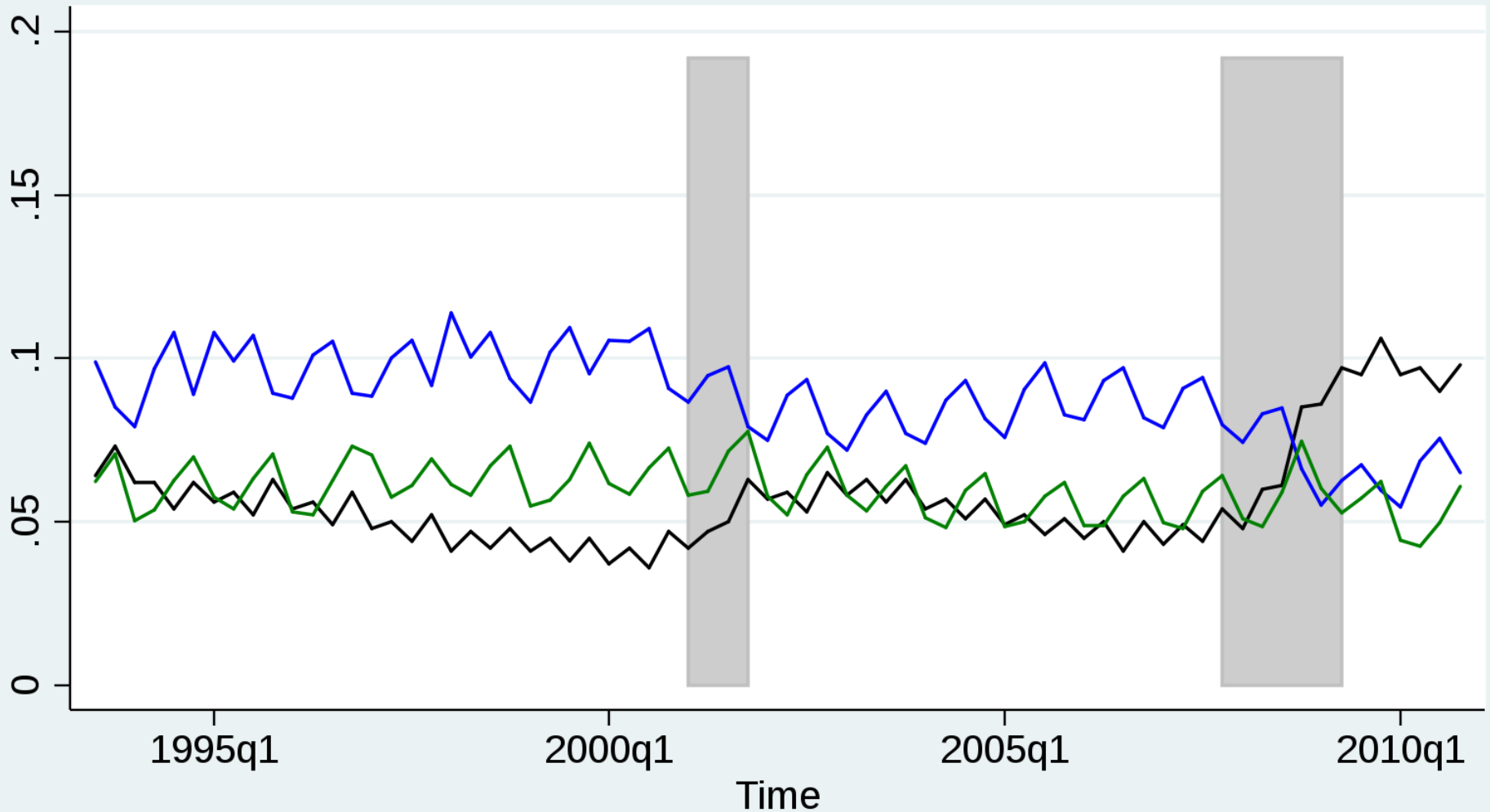
# Results

- Raw time series at the national level are in phase: trend + cycle components line up
- The excess accession rate is pro-cyclical and trends in the reverse direction of unemployment
- The job destruction rate is slightly counter cyclical and does not trend

# Time series of the Unemployment Rate and QWI series



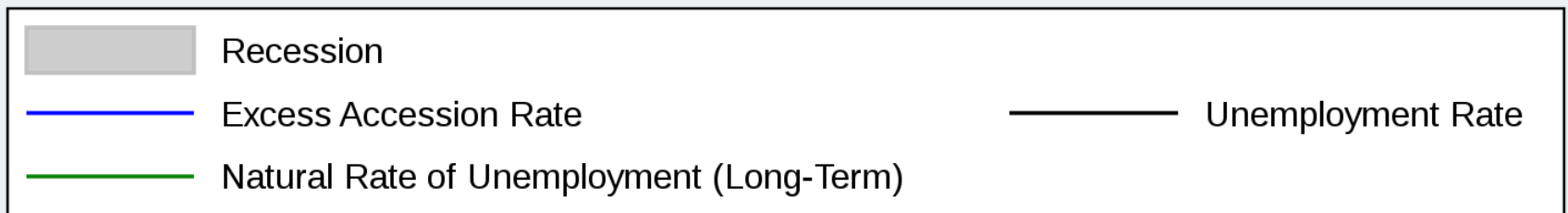
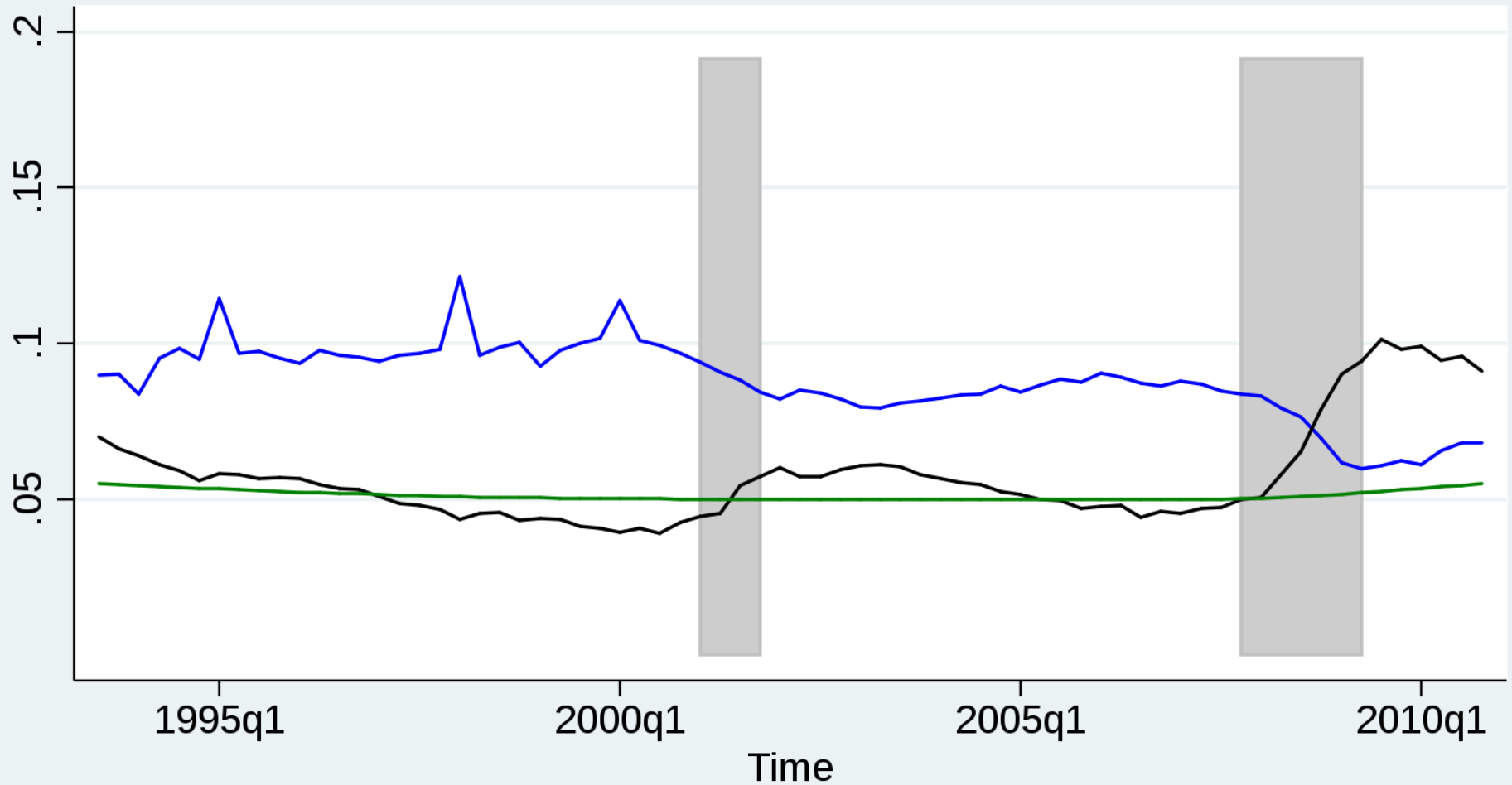
# Time series of the Unemployment Rate and QWI series



# Headline National Results

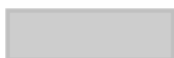
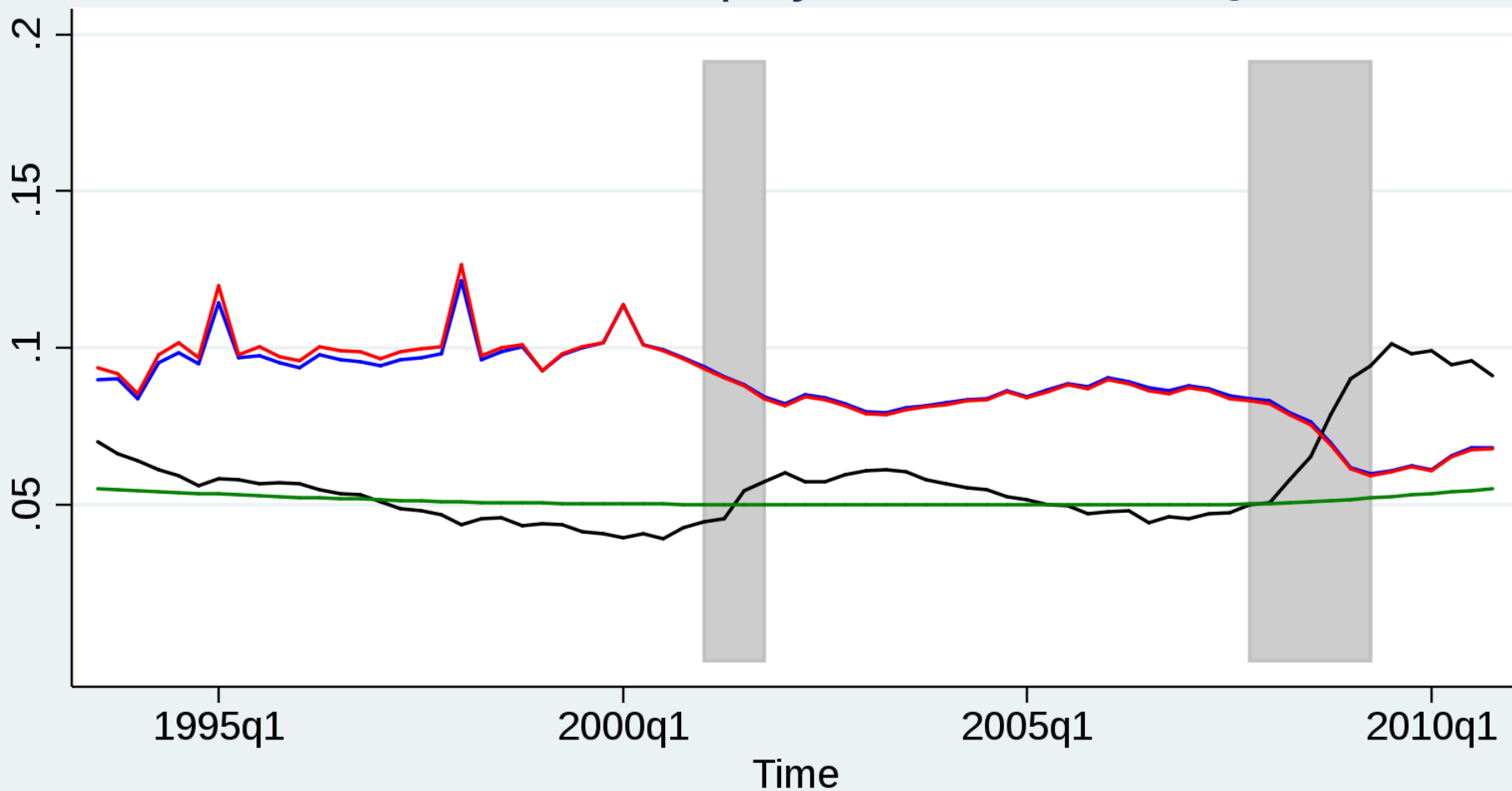
- The trend + cycle components of the excess accession rate and the national unemployment rate are essentially identical
- The excess accession rate is pro-cyclical
- The unemployment rate is counter-cyclical
- Any long run trend extracted from either is going to be essentially identical
- There are no composition effects

# Time series of the Unemployment Rate and QWI series





# Time series of the Unemployment Rate and QWI series



Recession



Excess Accession Rate



Natural Rate of Unemployment (Long-Term)



Unemployment Rate

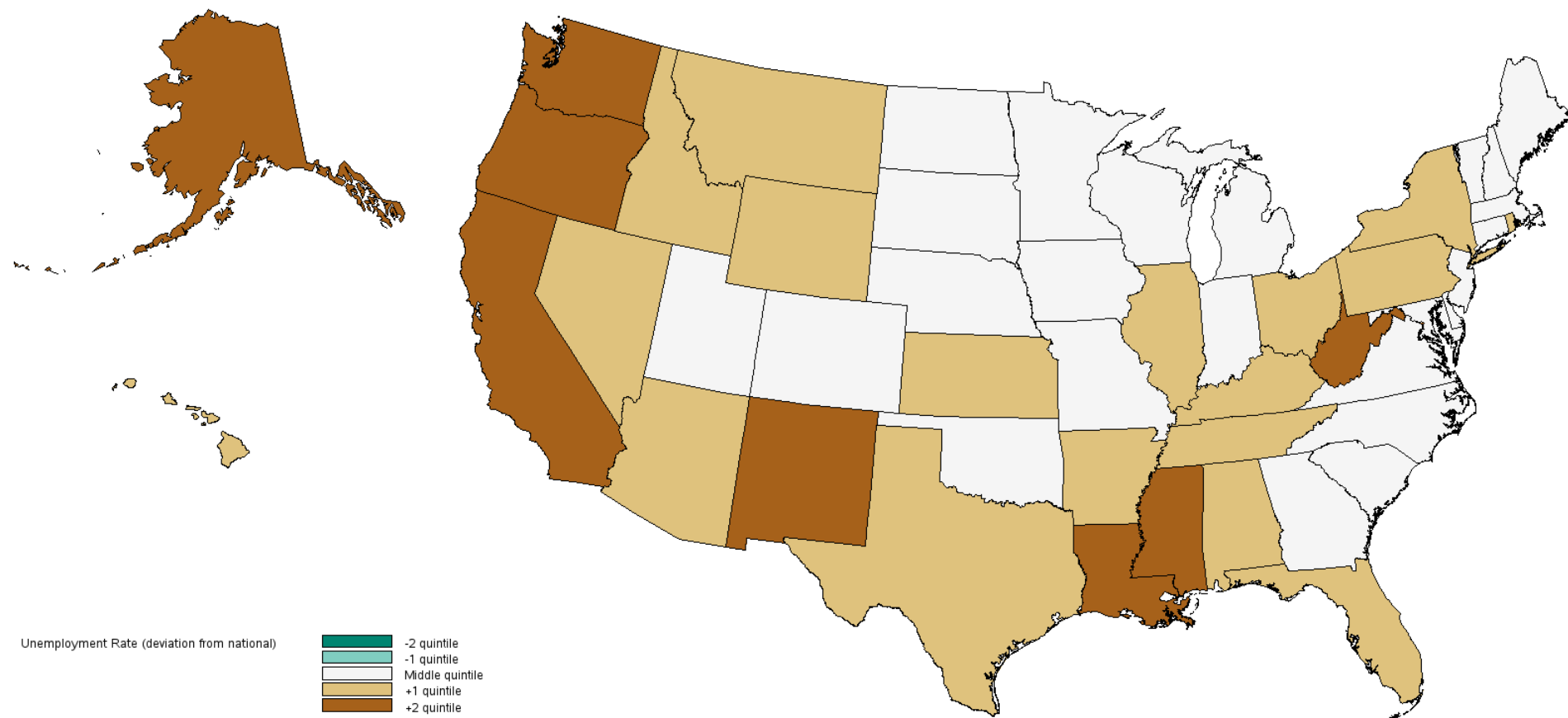


Excess Accession Rate (fixed)

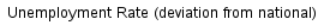
# Local Labor Market Results

- The national to local approach (LAUS) shows the Pacific coast states as well below average
- The middle of the country outperforms the two coasts

## 2000 Q2

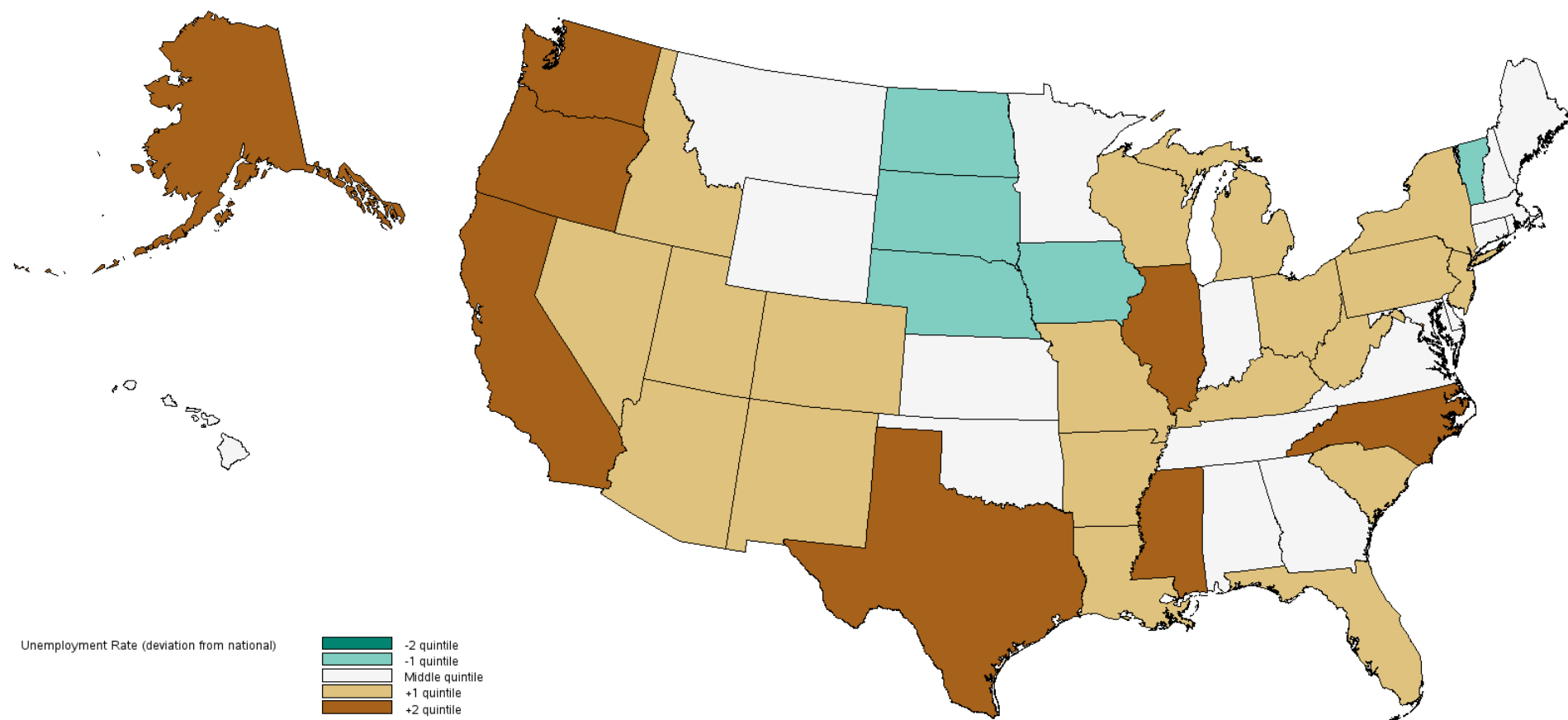


## 2001Q2



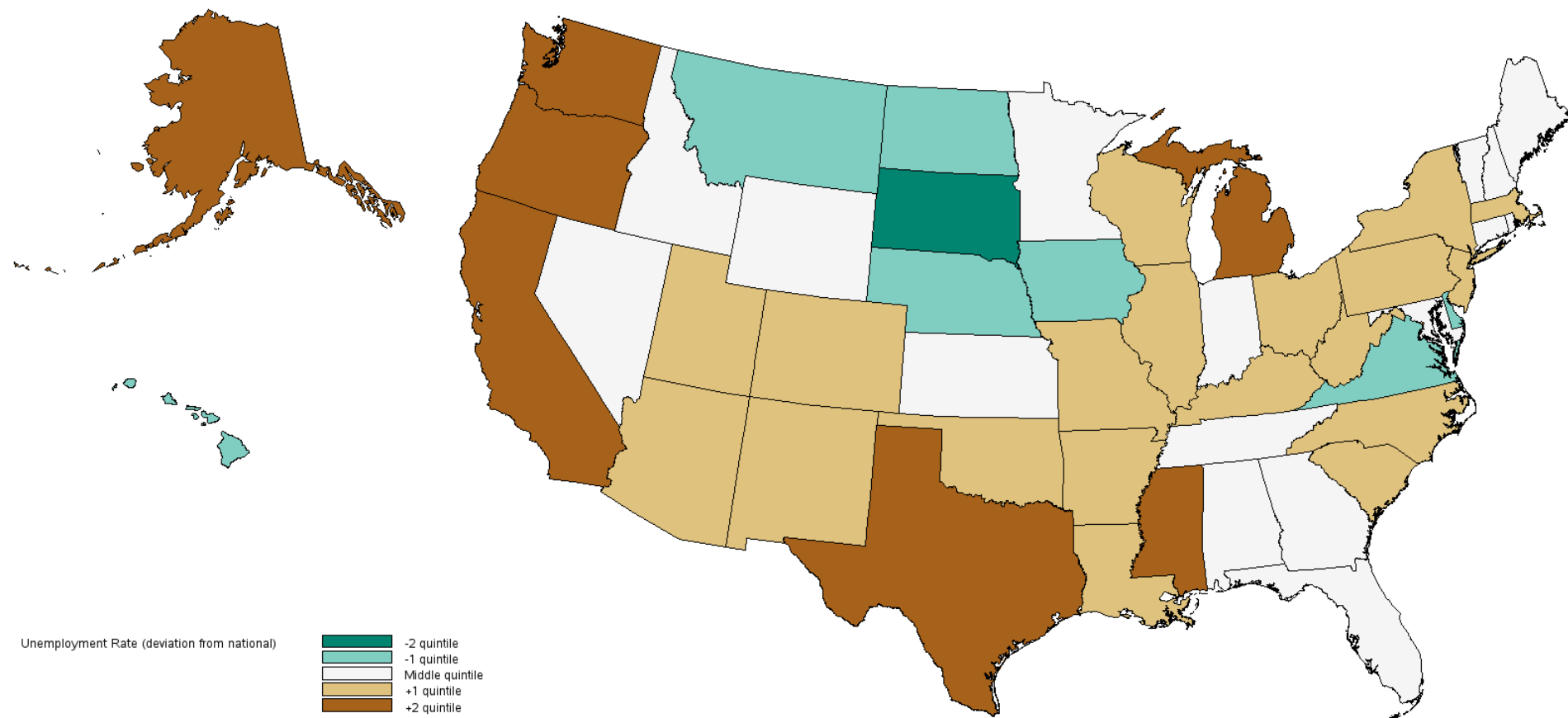
## Unemployment Rate (deviation from national)

2002Q2



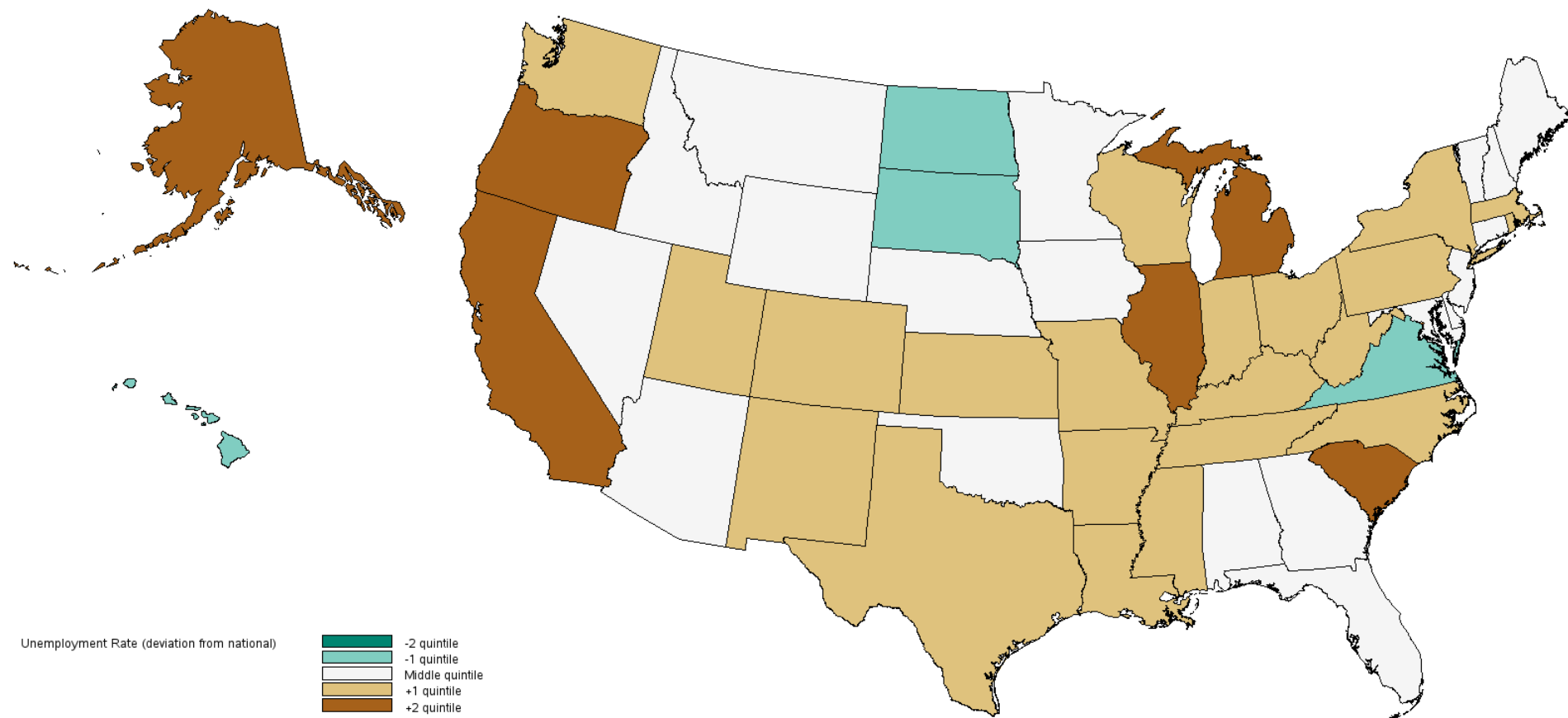
## Unemployment Rate (deviation from national)

2003Q2

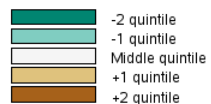


## Unemployment Rate (deviation from national)

2004Q2

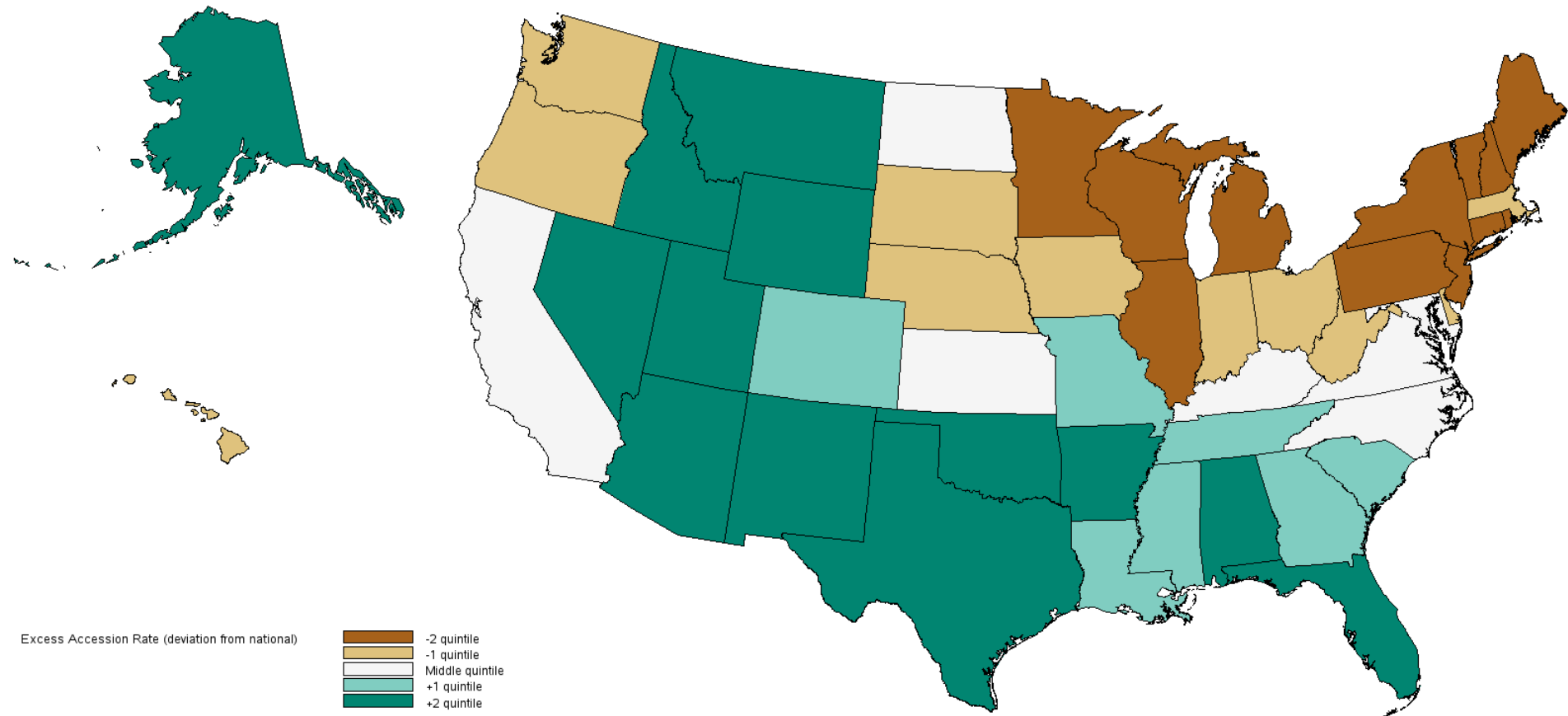


Unemployment Rate (deviation from national)



## Excess Accession Rate (deviation from national)

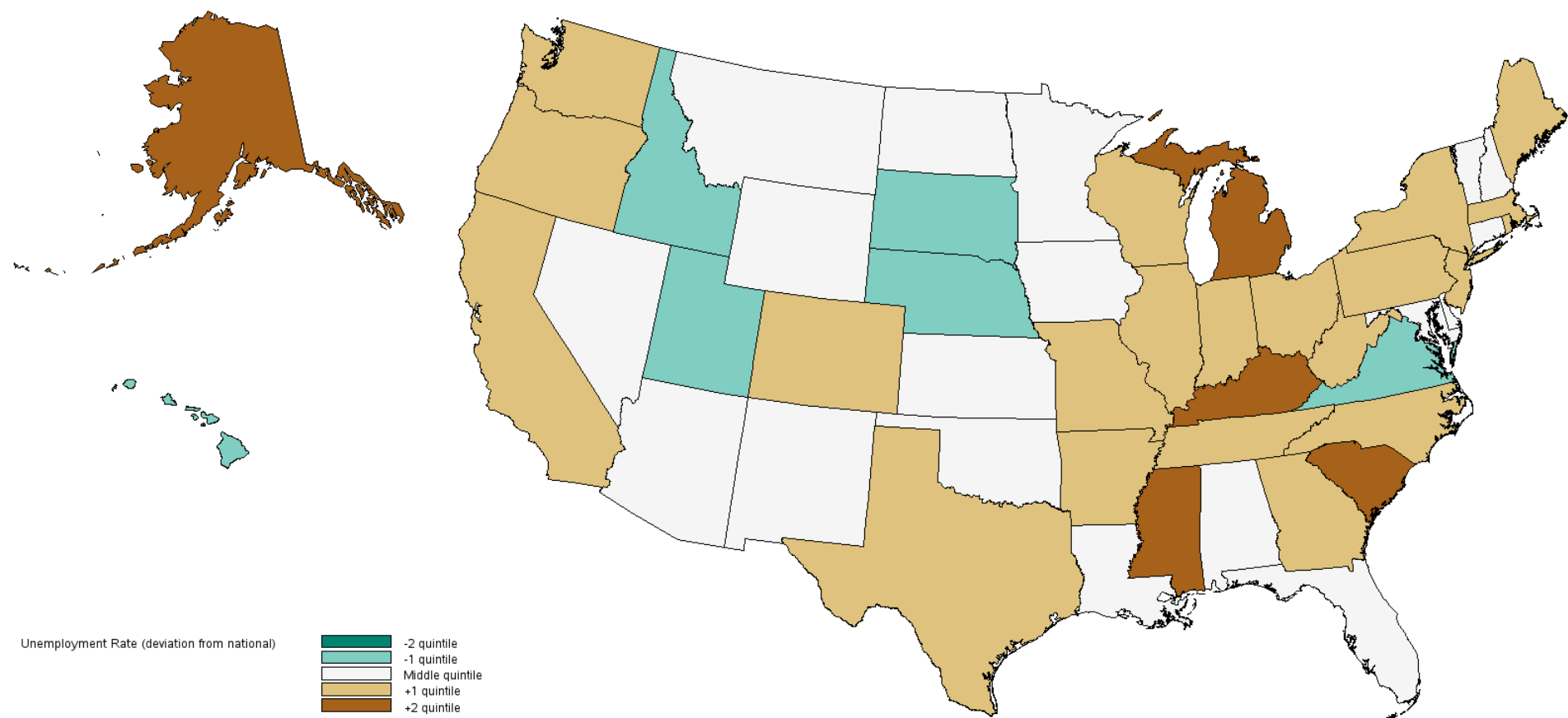
2005Q2





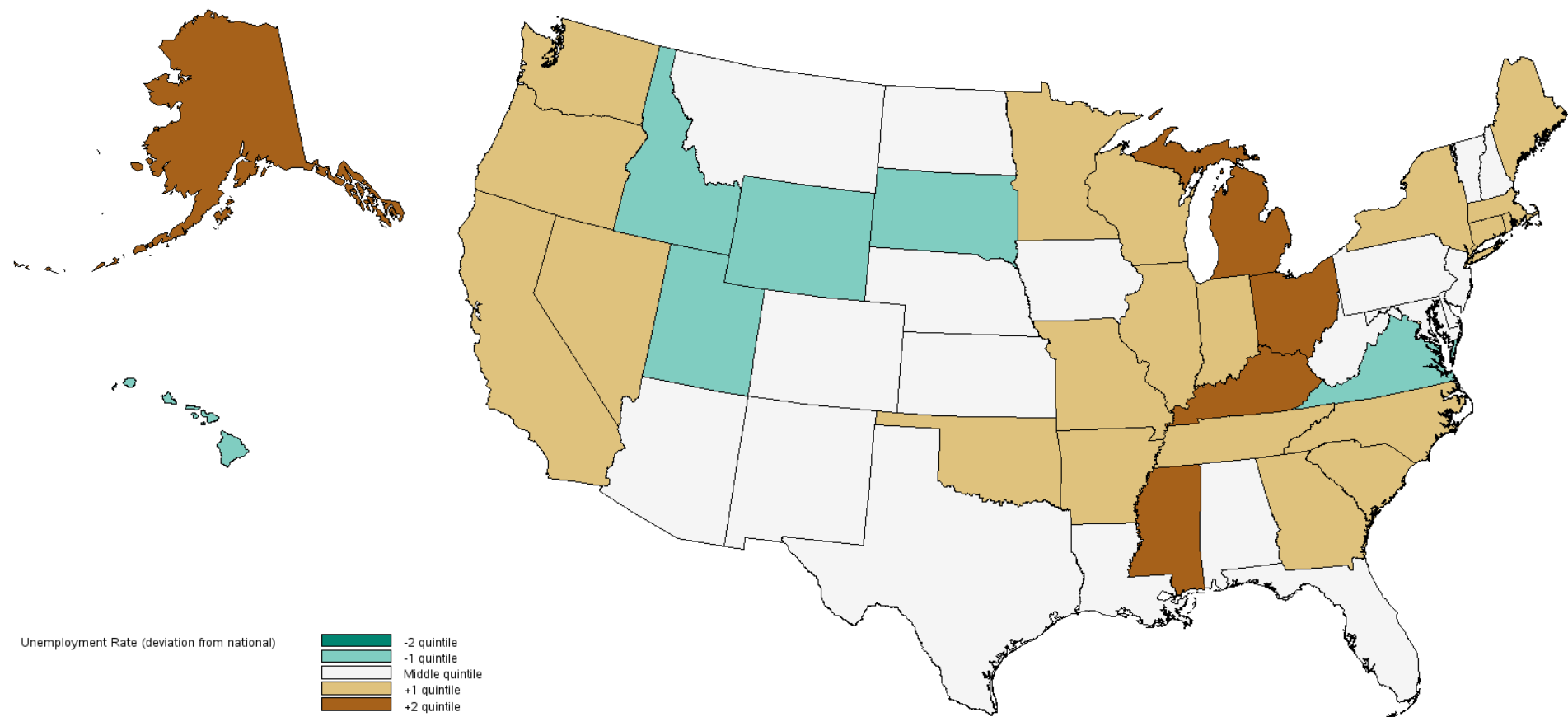
## Unemployment Rate (deviation from national)

2006Q2

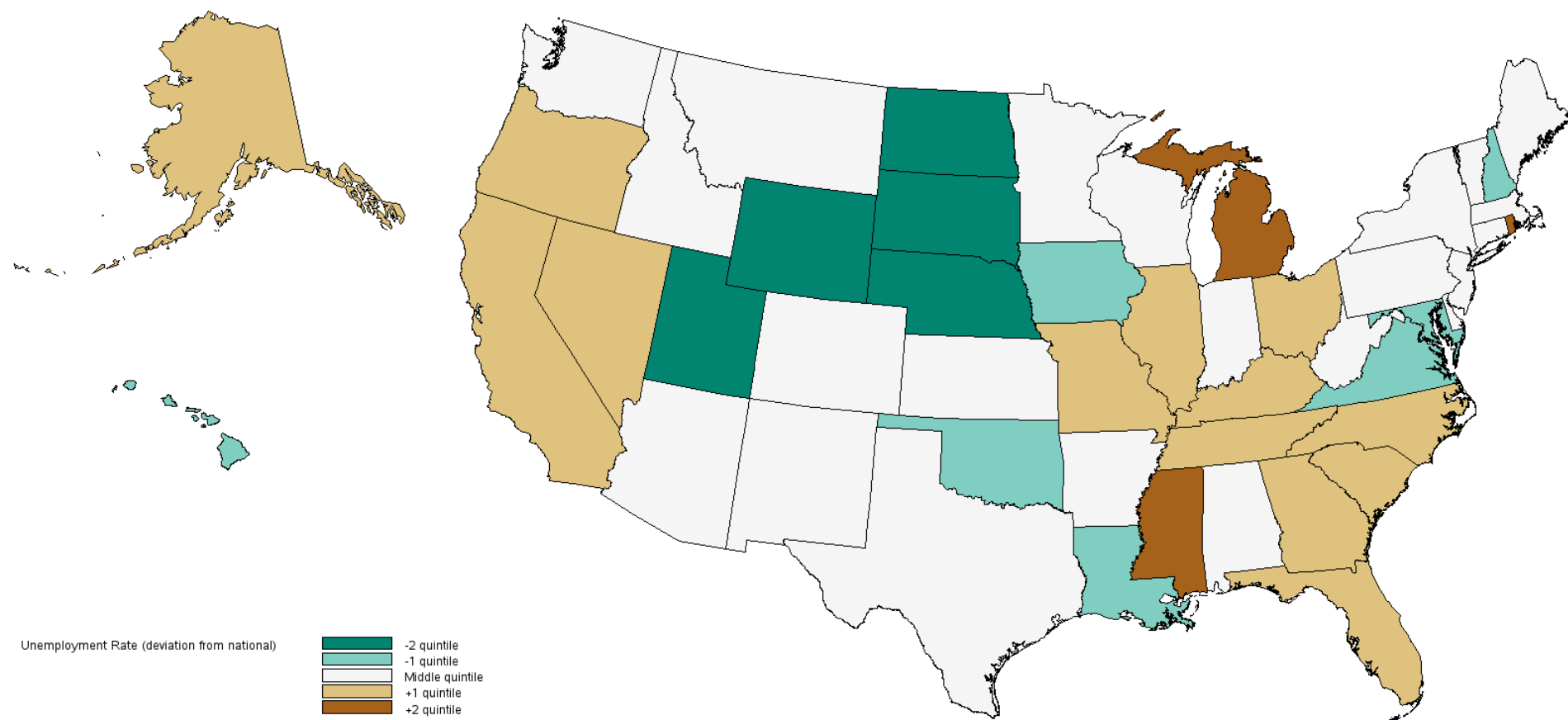


## Unemployment Rate (deviation from national)

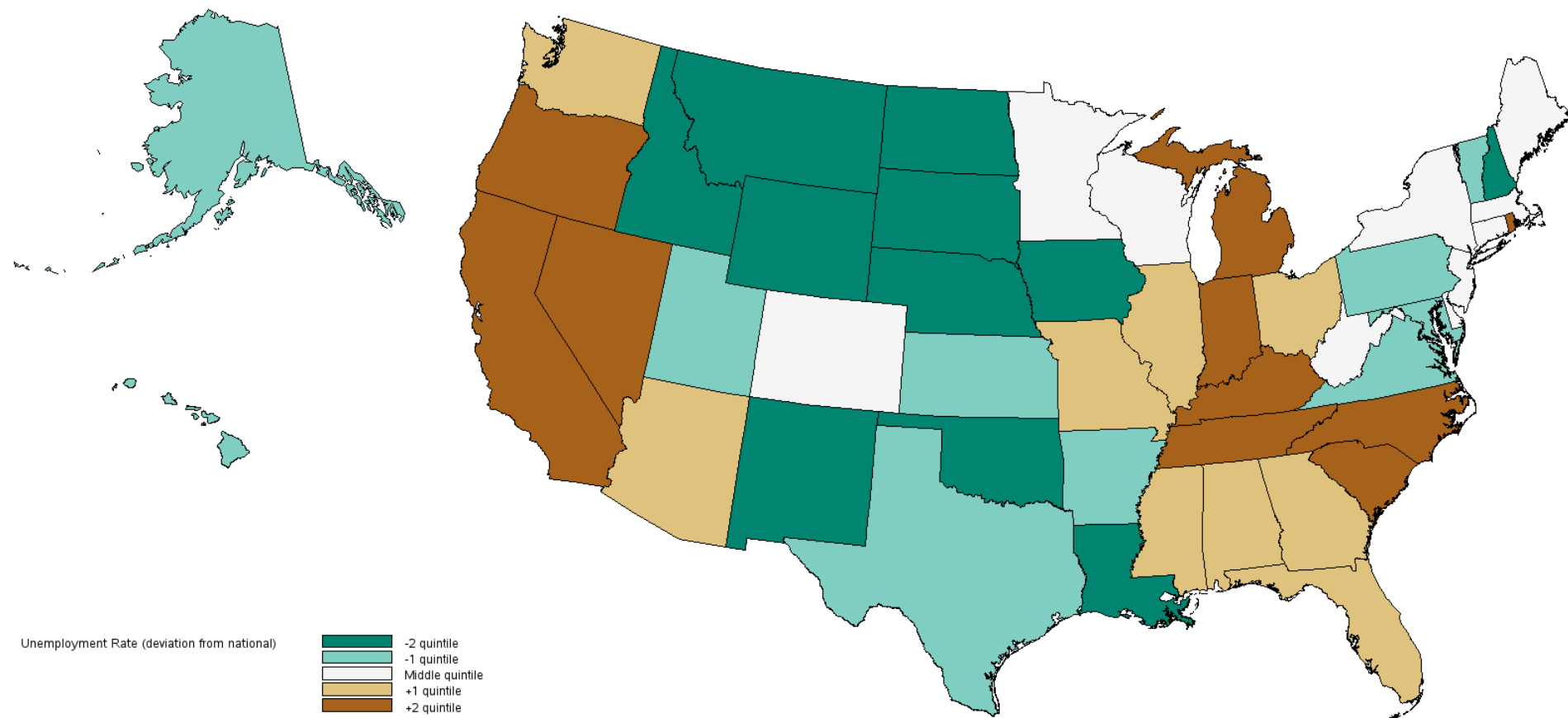
2007Q2



## 2008Q2

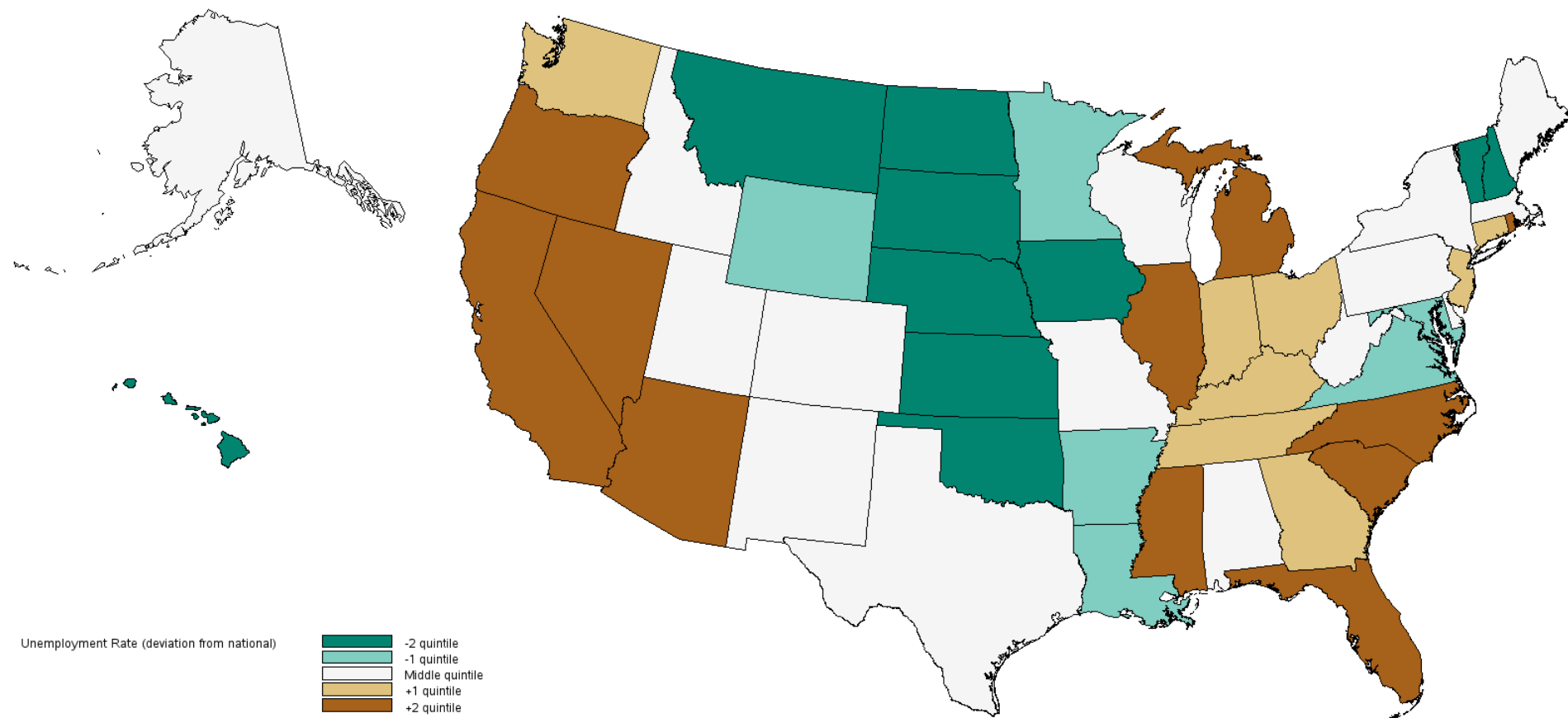


## 2009 Q2



## Unemployment Rate (deviation from national)

2010Q2

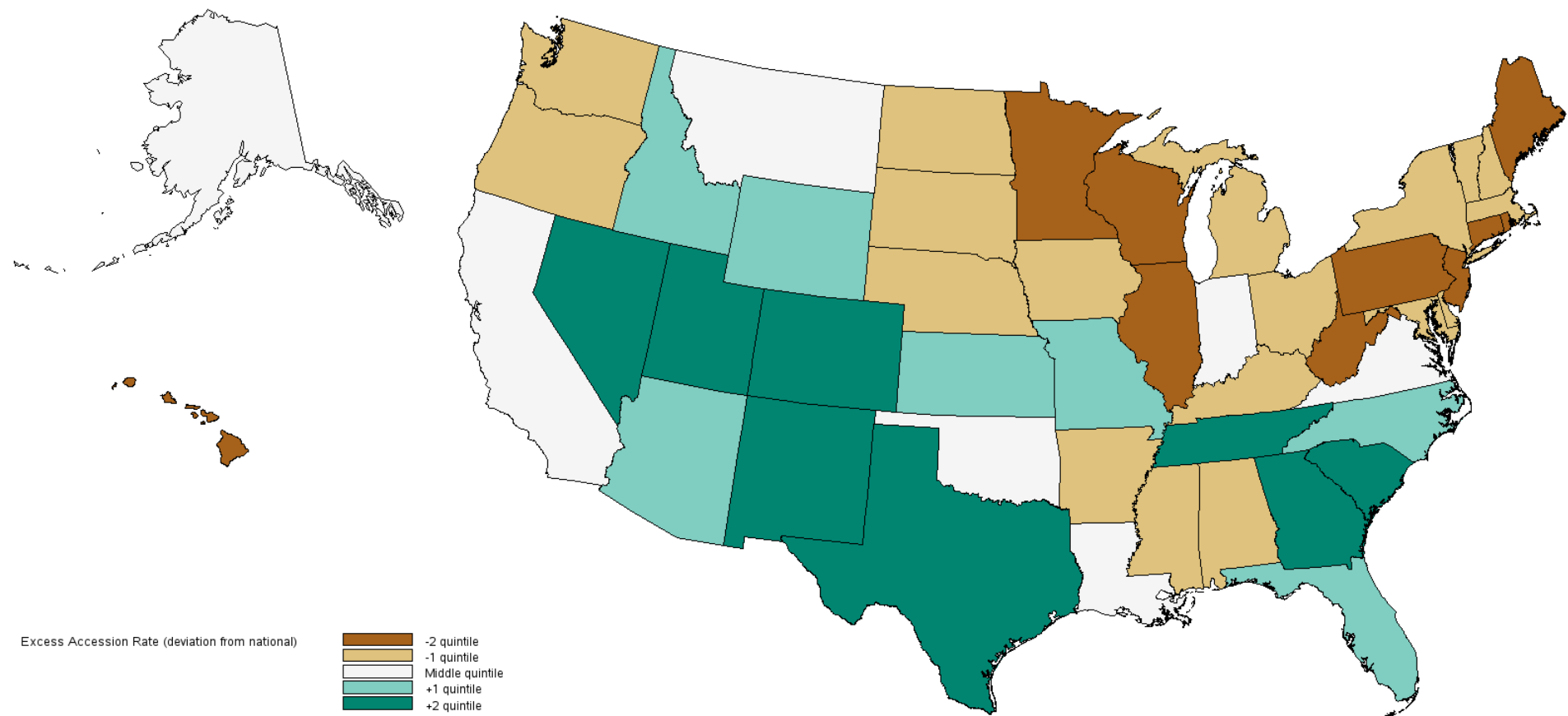


# Local to National

- State-level local labor market trends between 2000:2 and 2010:2 are based on the excess accession rate
- Middle of the country consistently better (higher excess accessions than national)
- Northeast and upper Midwest consistently worse (lower excess accessions than national)

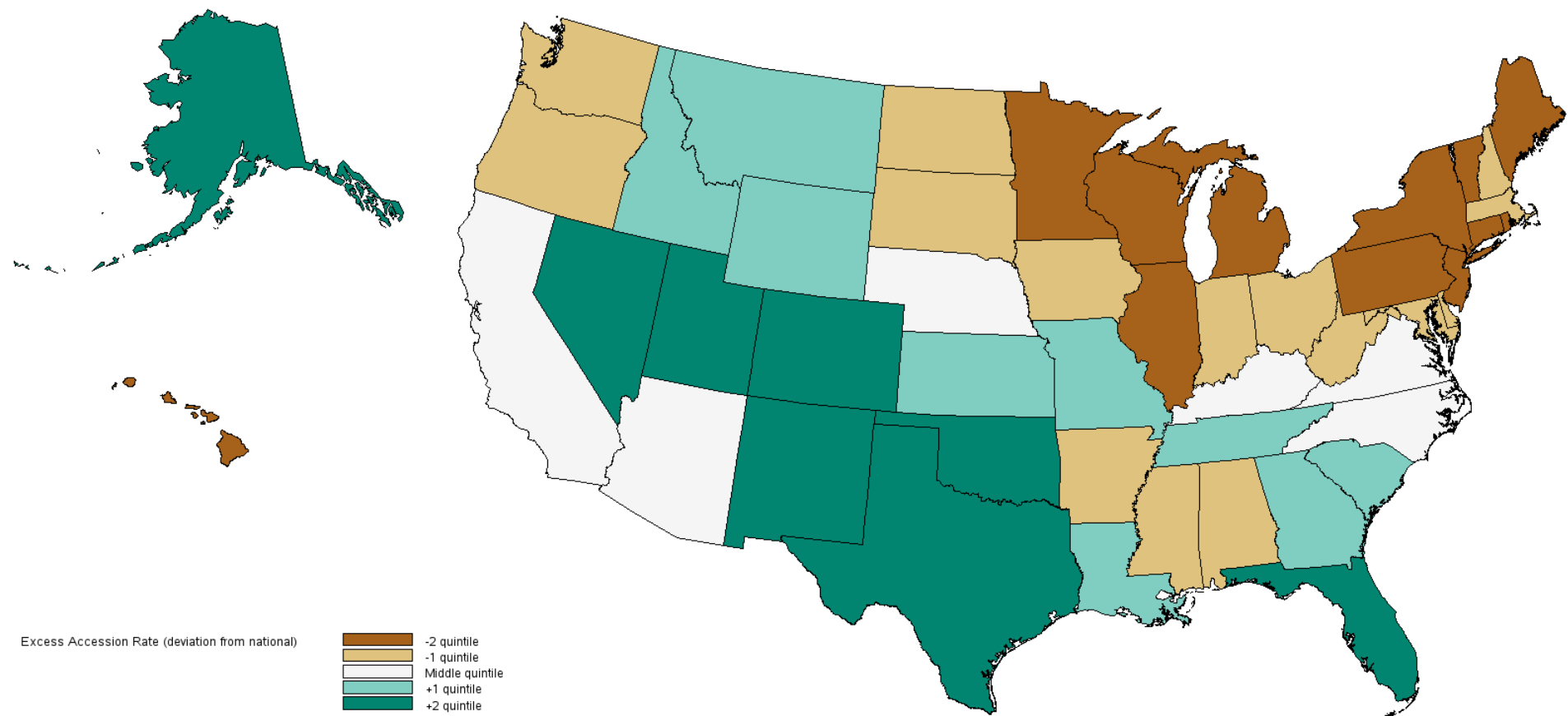
## Excess Accession Rate (deviation from national)

2000Q2



## Excess Accession Rate (deviation from national)

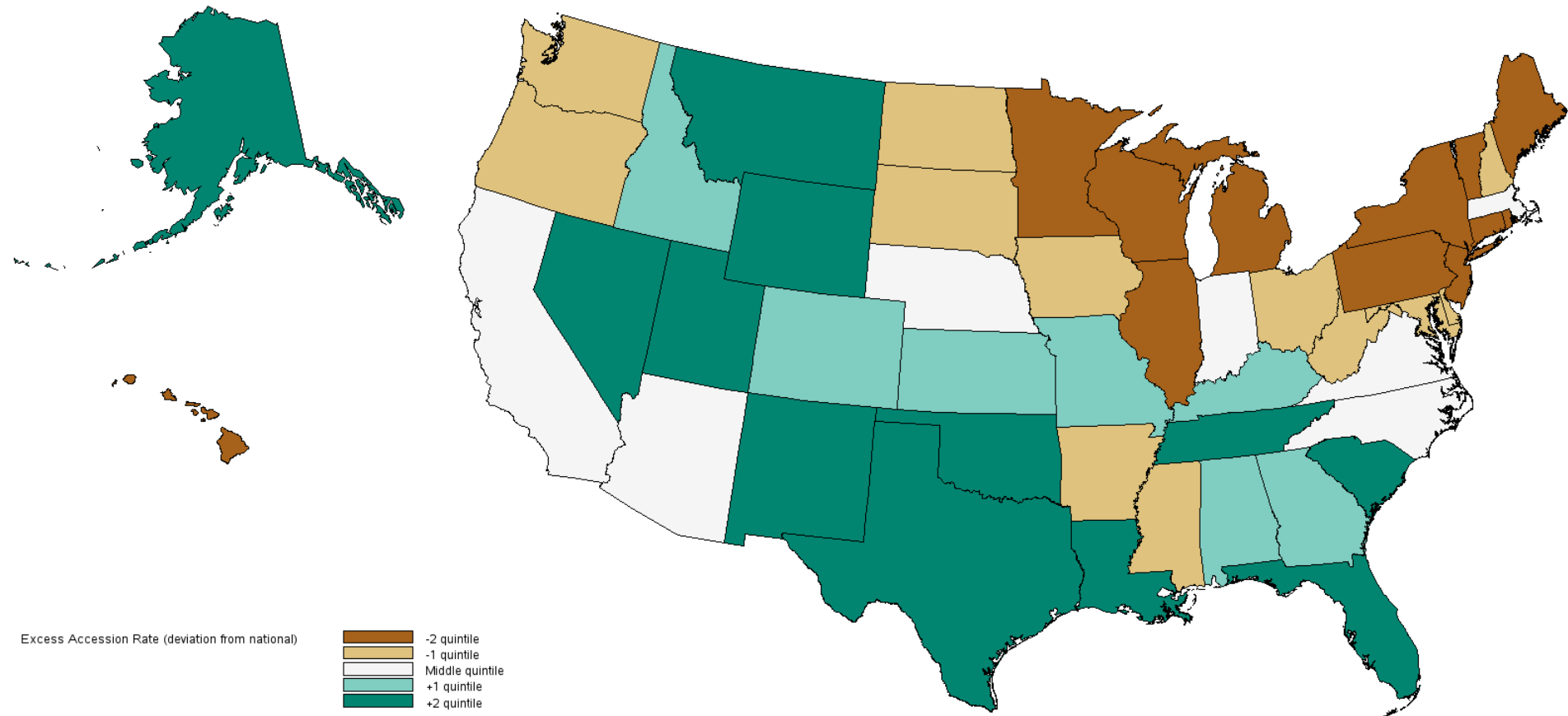
2001Q2





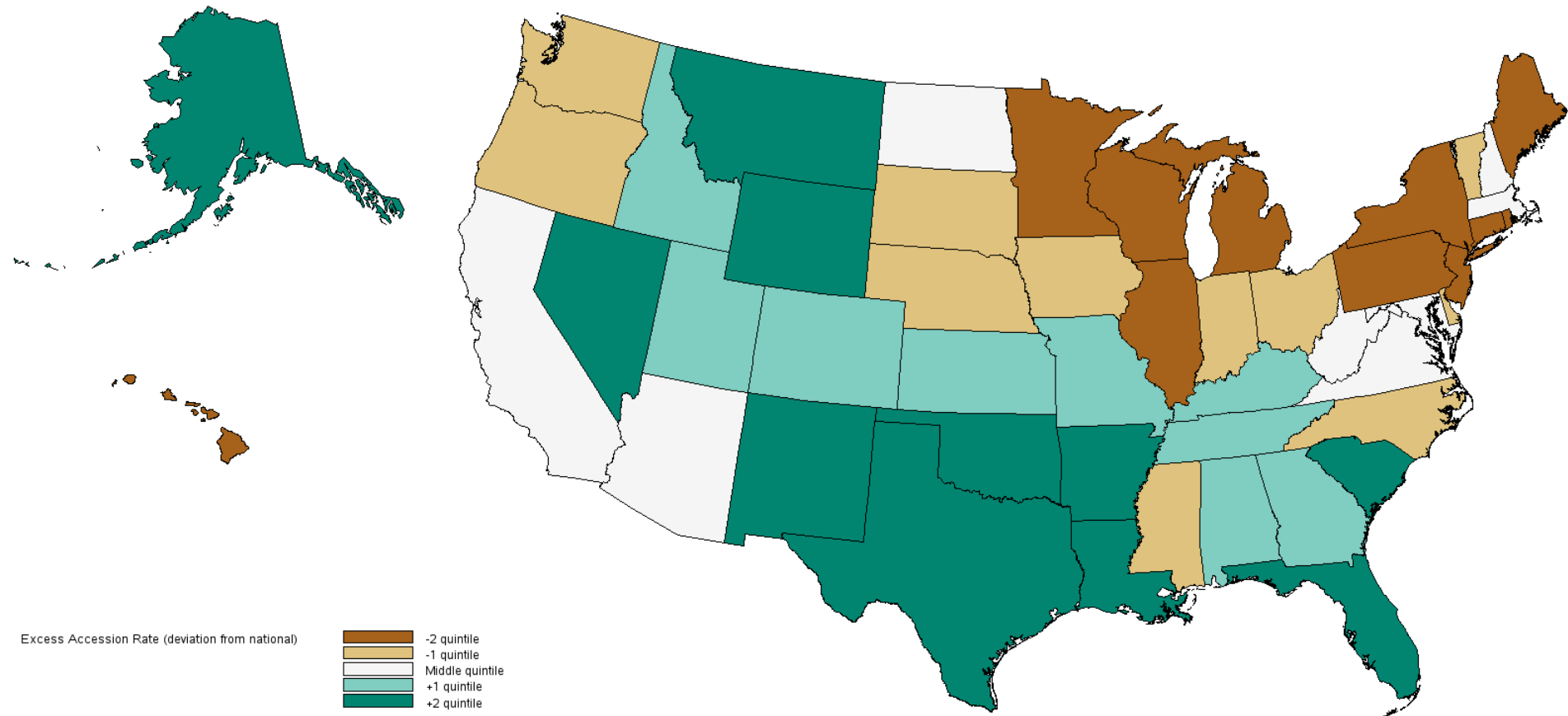
## Excess Accession Rate (deviation from national)

2002Q2



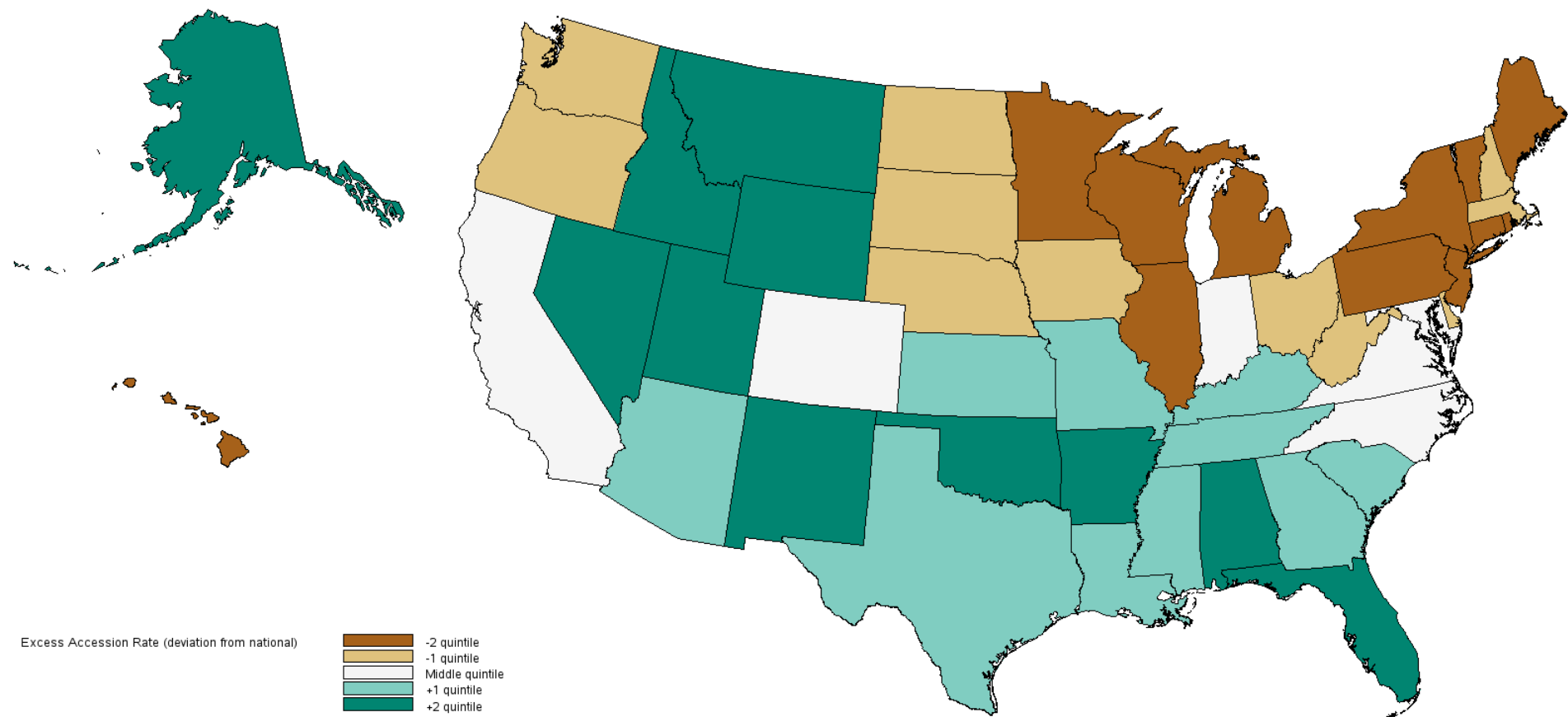
## Excess Accession Rate (deviation from national)

2003Q2

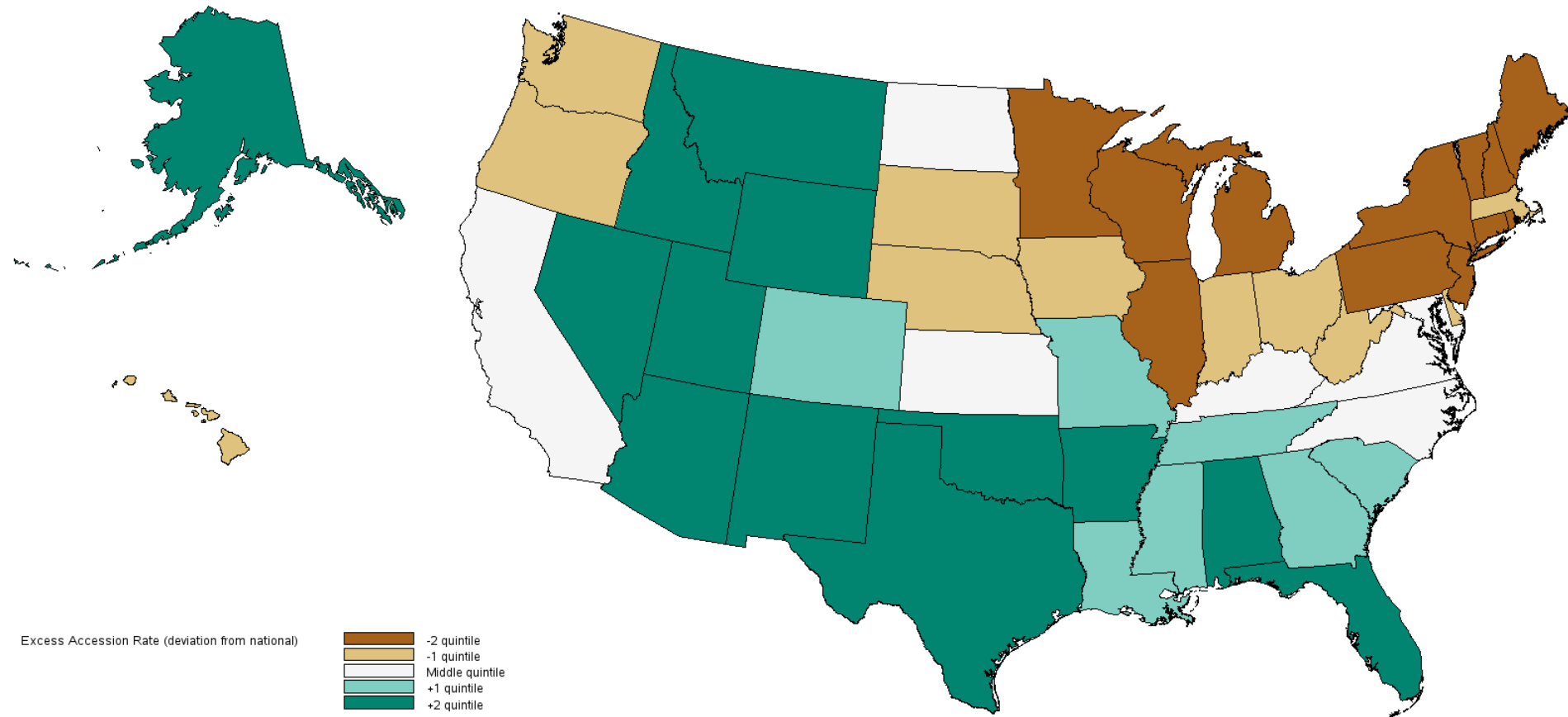


## Excess Accession Rate (deviation from national)

2004Q2

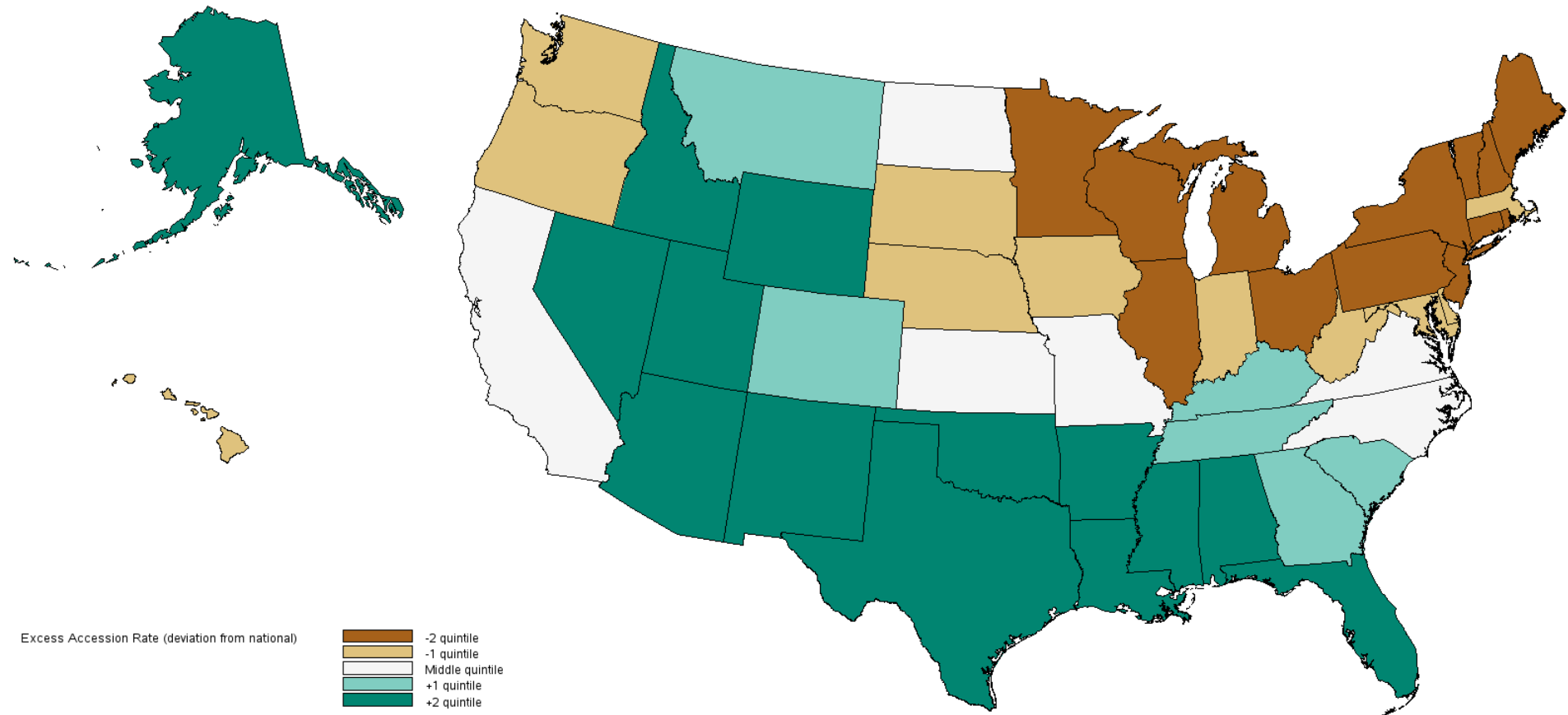


## 2005 Q2



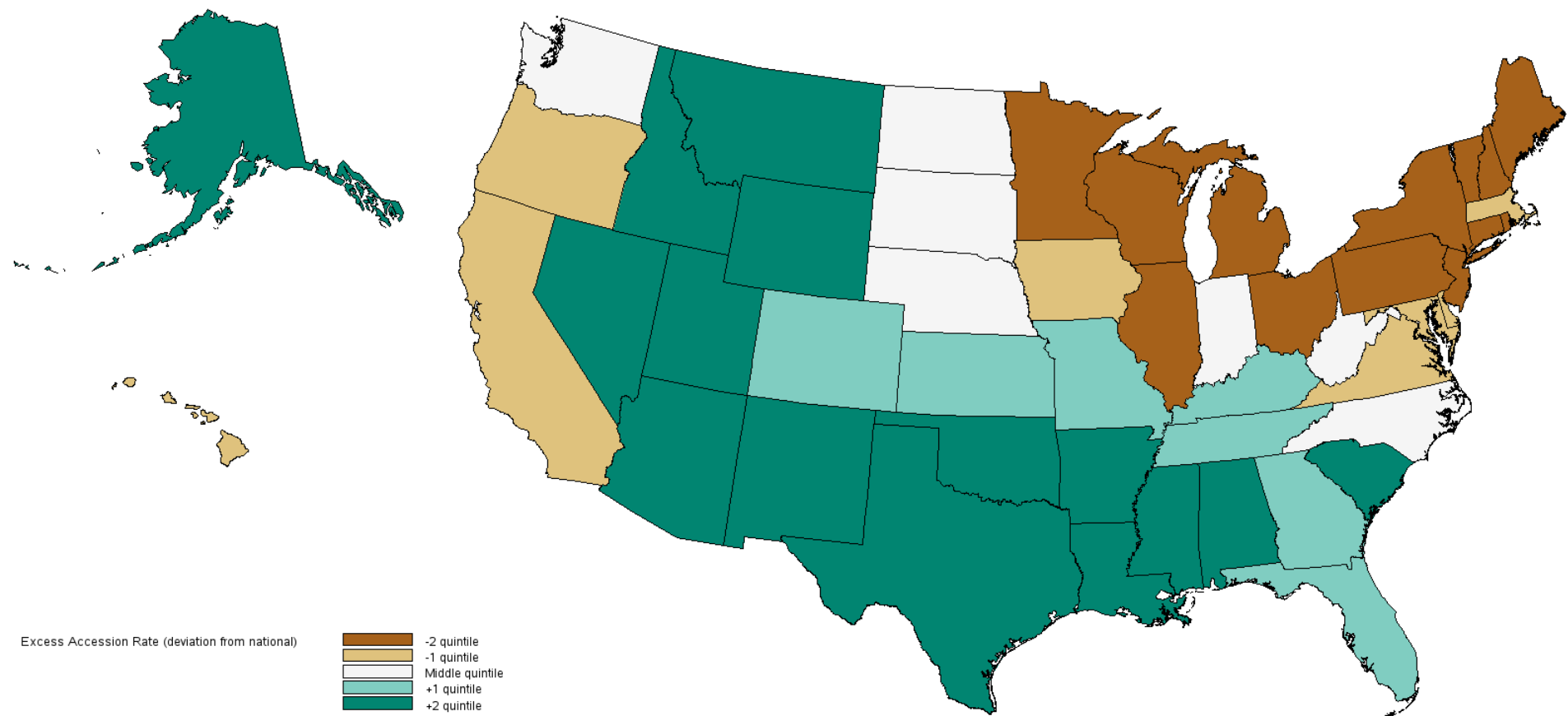
## Excess Accession Rate (deviation from national)

2006Q2



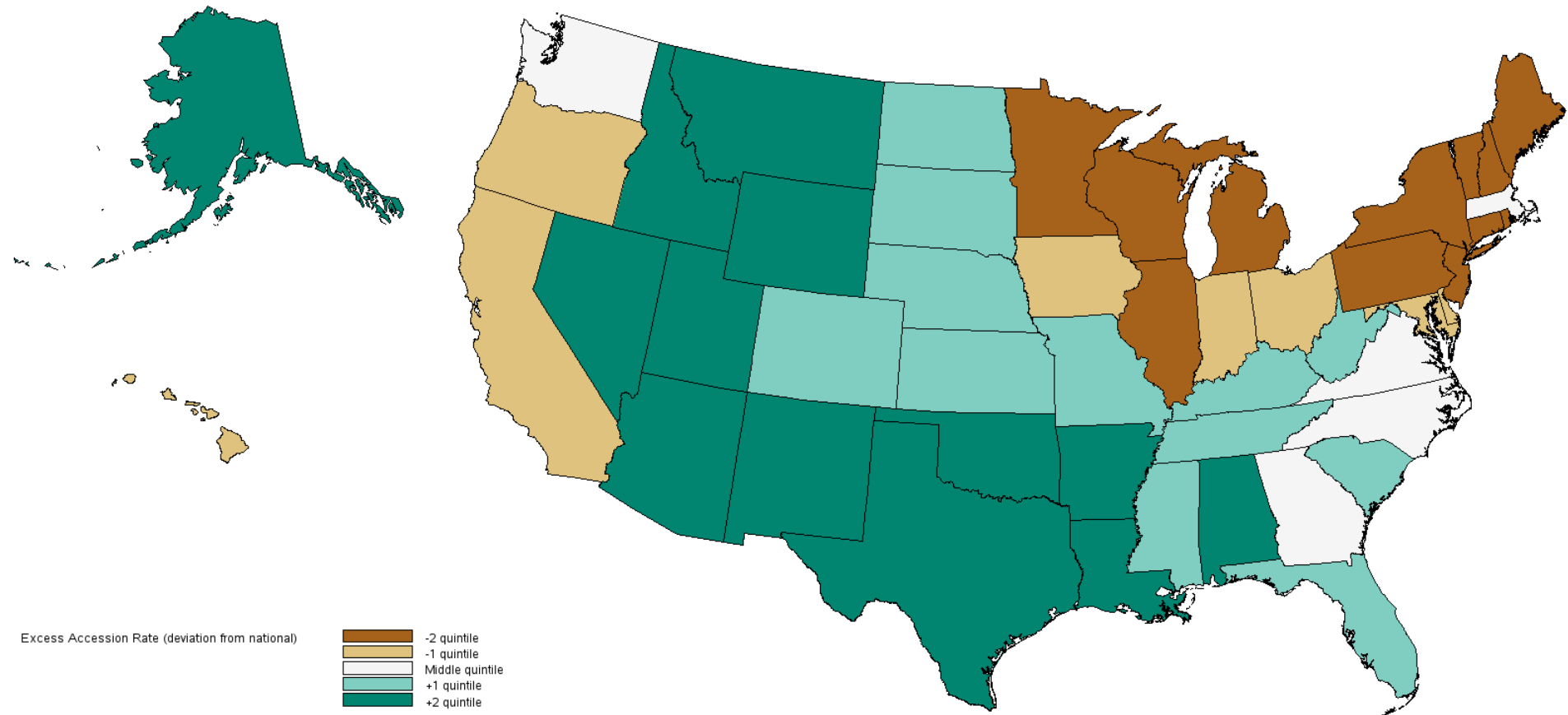
## Excess Accession Rate (deviation from national)

2007Q2



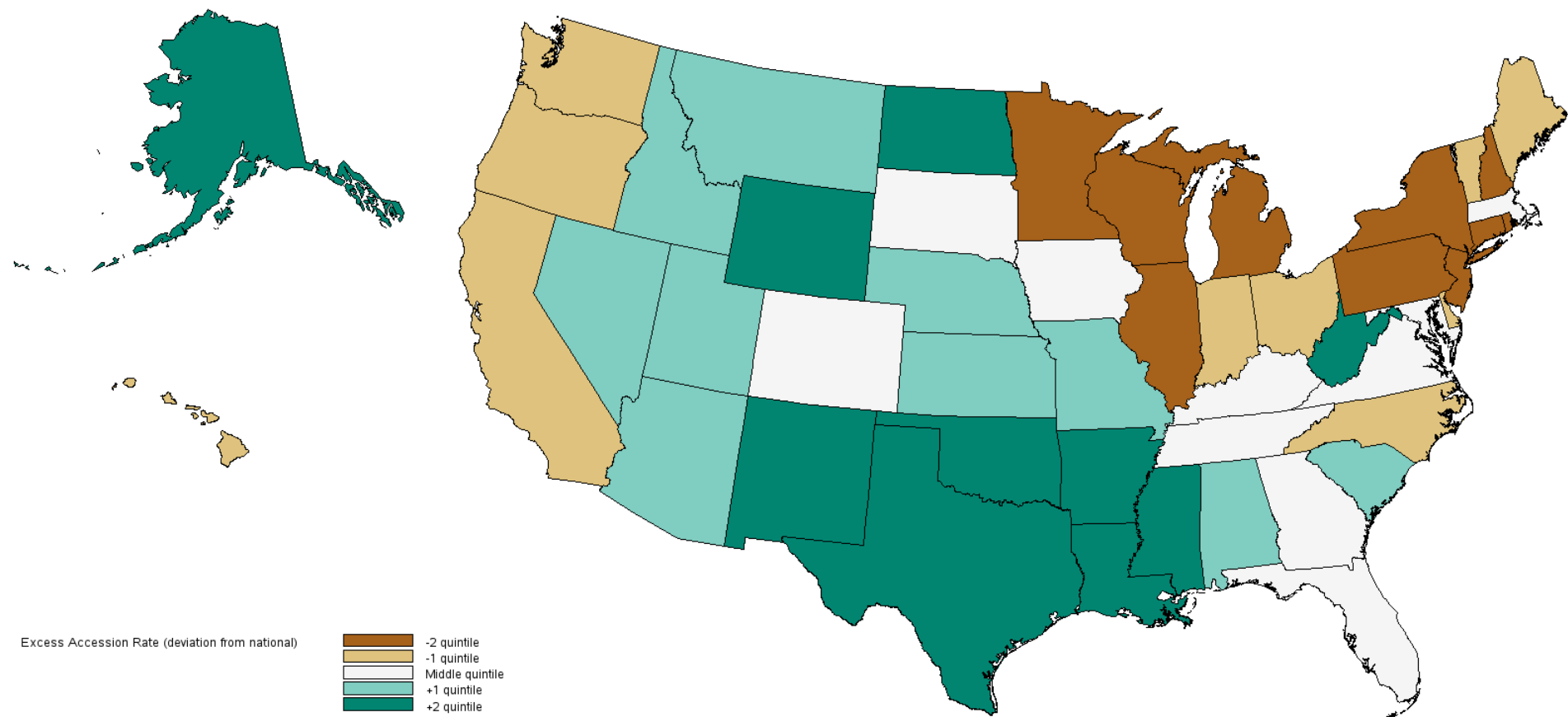
## Excess Accession Rate (deviation from national)

2008Q2



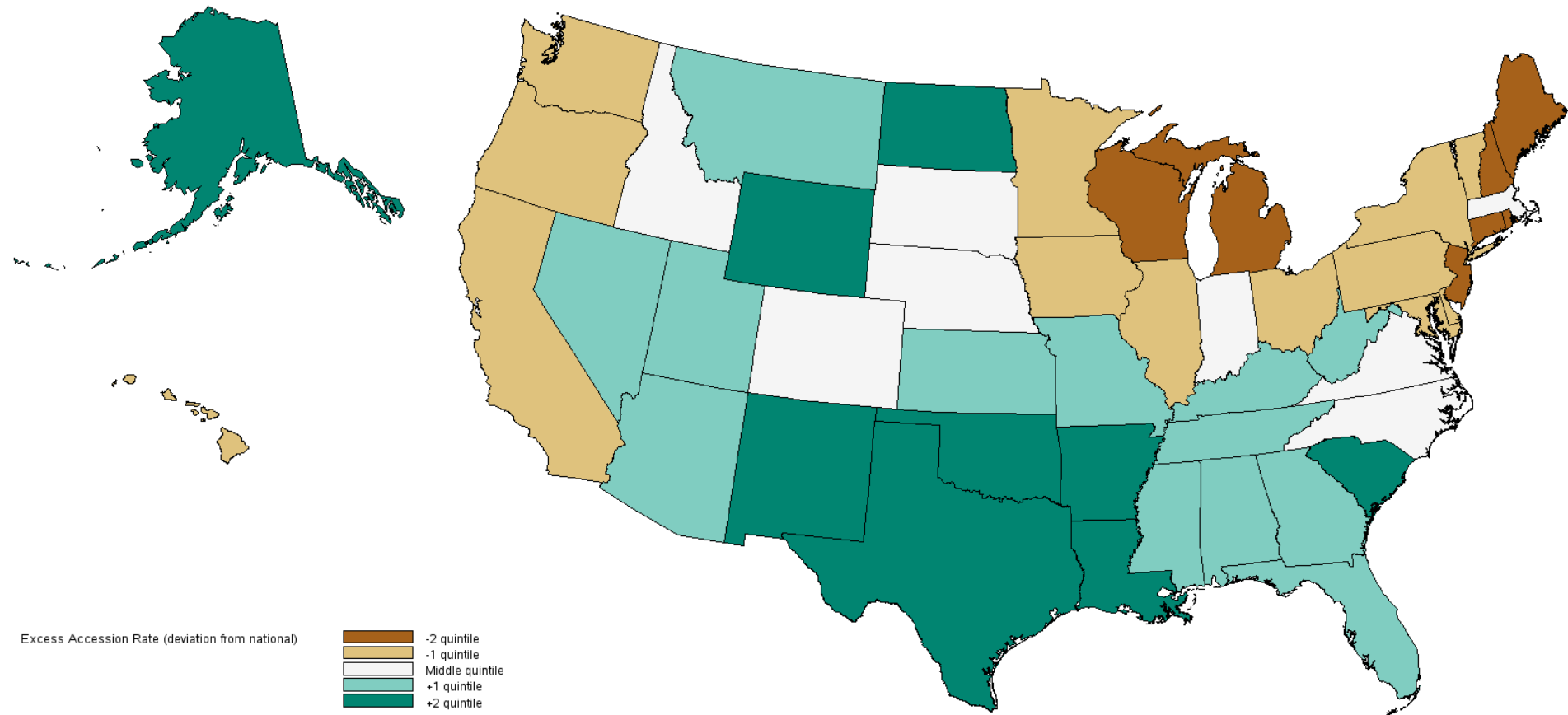
## Excess Accession Rate (deviation from national)

2009Q2





## 2010Q2



# Conclusions

- Approaching the U.S. labor market with “local to national” or “national to local” indicators leads to the same conclusions about trend + cycle behavior
- Natural rates of unemployment estimated from the trend component of either approach are going to give a very similar answers